THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVII. No. 684.] LONDON, JUNE 20, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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GAS-RETORTS, Introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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Established at the commencement of Gas Lighting.

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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanised Tubes and High-Pressure Tubes, &c.

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FIRST-CLASS MATERIALS & WORKMANSHIP;
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And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

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RETORT-SETTING A SPECIALITÉ.

RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL OR ELSE NO MONEY TAKEN FOR THE CONTRACT.

PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America
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FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
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IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

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WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
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CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
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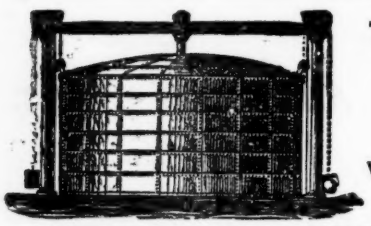
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS



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RETORTS, ANNULAR AND PIPE CONDENSERS,
WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS
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STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,
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REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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WEST'S GAS IMPROVEMENT COMPANY,

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ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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FOR GAS, STEAM, AND WATER;

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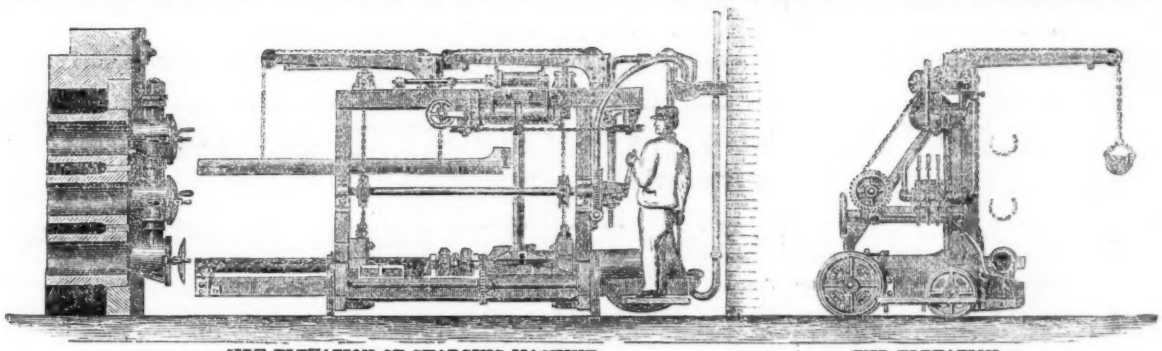
London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

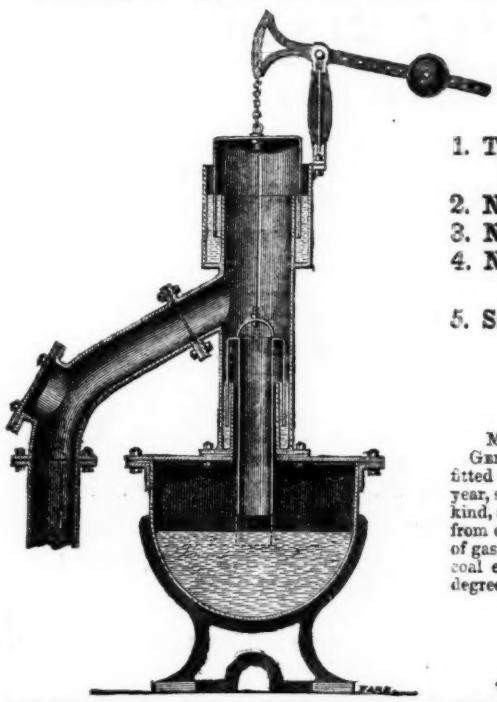
(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Tenby Gas-Works, March 29, 1876.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—In reply to your inquiry, I have to say that all the retorts at these works are fitted with your Self-Acting Patent Dip-Pipes. They have been in use now for more than a year, some for more than two years. They have never required repair or attention of any kind, and work admirably. By the use of these removable dips the retorts are kept quite free from carbon, the charges burn off more quickly than before they were adopted, and the yield of gas is increased. We get regularly a weekly and monthly average yield of gas per ton of coal exceeding 10,400 feet of 14-candle gas, and I attribute this excellent result in no small degree to the use of these Self-Acting Removable Dip-Pipes.

I am, gentlemen, yours faithfully,

(Signed) EDMUND H. STEVENSON.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

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MESSRS. CHANDLER & SONS,

Gas Engineers, Patentees, and Contractors, Triennial Contractors to Her Majesty's Government,

UNDERTAKE THE

ERECTION OF GAS OR WATER WORKS;

CONTRACTORS FOR PIPE-LAYING AND GAS-FITTING.

SOLE MANUFACTURERS OF THE CHANDLER AND STEVENSON PATENT SELF-ACTING DIP-PIPE.

ESTIMATES FURNISHED FOR EXTENSIONS OR ALTERATION TO EXISTING WORKS.

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IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

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GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

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ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

WILLIAM SUGG,

GAS ENGINEER,

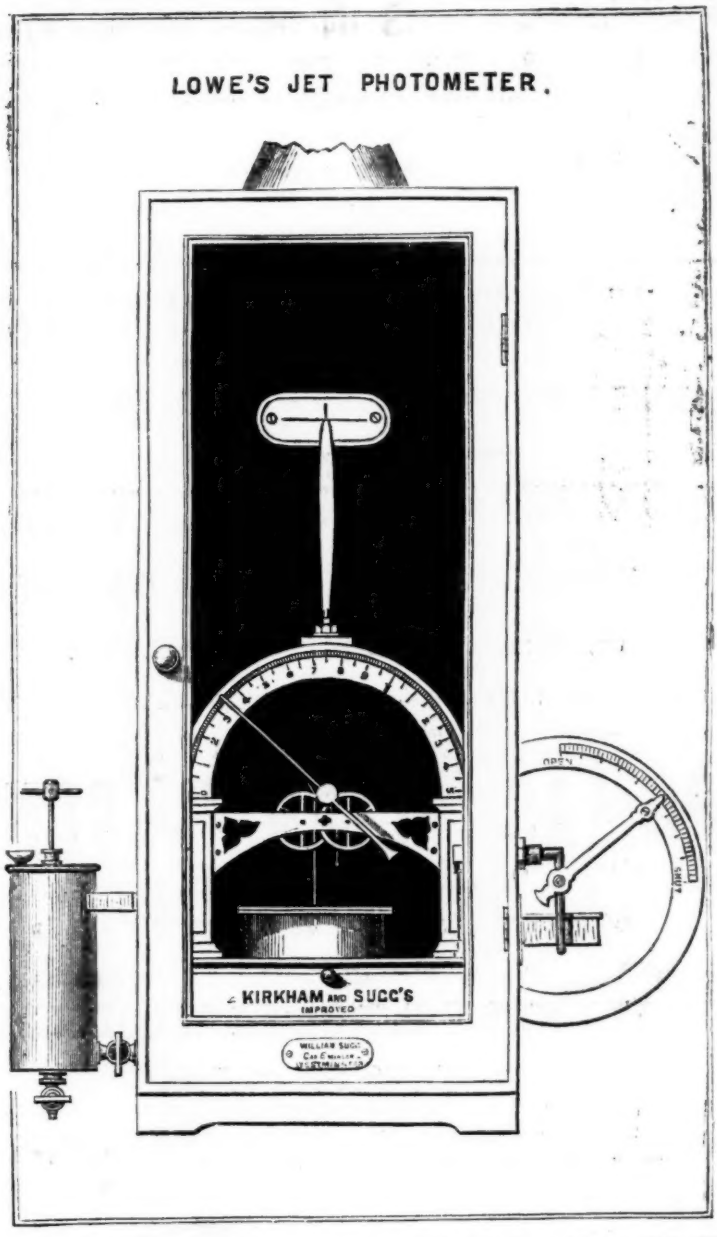
VINCENT WORKS, VINCENT STREET,

WESTMINSTER, S.W.

"EVANS"

Photometers,

which do not require a Dark Room, with every Fitting accurately made to Gauge, French Polished Bench and Drawers complete, as approved by the Gas Referees.



"LETHEBY"

Photometers,

with Fittings and Bench complete for Dark Room, as approved by the Gas Referees.

LOWE'S JET PHOTOMETER

(KIRKHAM AND SUGG'S IMPROVEMENTS),

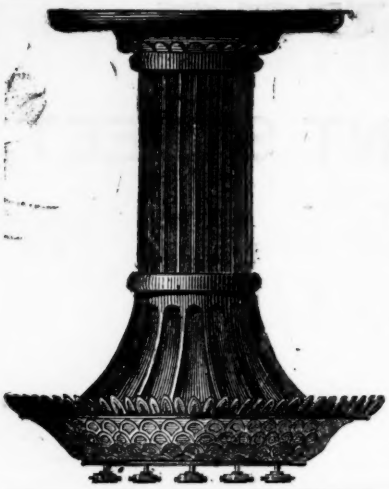
With new external Water-Line Regulator; Improved Micrometer, with Quadrant divided into 45 degrees; Valve, with *pro ratâ* opening; Improved Ventilator, Purple Glass Height of Flame Measurer; King's Gauge, working on Friction Rollers. In French Polished Pine Case. Diagram for ditto for finding the Illuminating Power in Candles.

PRICE £12 10s. COMPLETE.

Can also be had with additional Scale on Pressure Gauge, to show by inspection the Illuminating Power in Sperm Candles, at a slight extra cost.

NOTE.—When an order is given for a Jet Photometer with this latter addition, it will be necessary to state about the quality of Gas for which it will be used. The range in candles will not be more than three or four.

PRICE LISTS WILL BE FORWARDED POST FREE ON APPLICATION.



HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

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IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

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TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING

RETORT-LIDS,

WITH

HOLMAN'S NEW PATENT

BRACKETED CROSS-BARS,

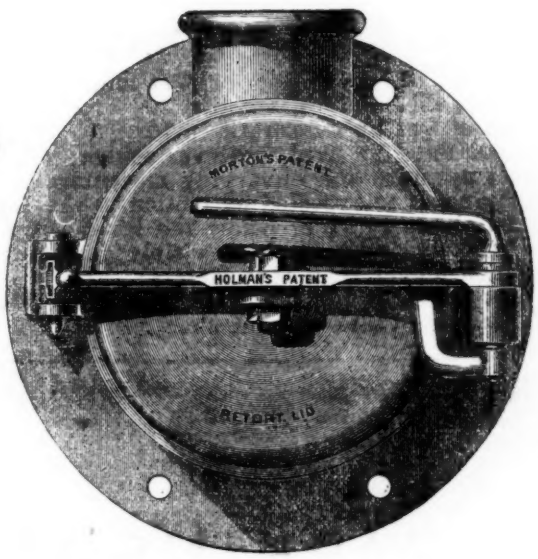
ANTI-FRICTION CATCHES, AND ECCENTRIC FASTENINGS.

NO LUTING.

NO DUPLICATE LIDS REQUIRED.

INSTANTANEOUS SEALING EFFECTED.

VERY DURABLE.



HOLMAN'S NEW SELF-SUSTAINING CROSS-BAR ENSURES FREEDOM OF JOINT, AND MAINTAINS PARALLEL POSITION OF THE LIDS.

By the employment of MORTON'S PATENT SELF-SEALING RETORT-LIDS, with HOLMAN'S PATENT ECCENTRIC FASTENINGS, the old-fashioned, cumbersome, and expensive method of sealing Retorts, by luting the lids with lime and other materials, is entirely dispensed with.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, over 20,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where nearly 4000 are in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Barnet.

The Gas-Works, Royal Arsenal, Woolwich.
" do. Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.

The Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.
" Bournemouth do.
" Ystrad do.
" Cardiff do.
" Rochester do.

The Keighley Gas-Works.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,
(Signed) G. C. TREWBY.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 20, 1876.

Circular to Gas Companies.

SINCE our last publication was issued, a notice from the Board of Trade has appeared, announcing an intended application to Parliament for leave to introduce a Bill, which may be shortly described as a measure to amend the law relating to the supply of gas on the Surrey side of the Thames. The notice certainly does not err on the score of want of comprehensiveness; but a wise parliamentary agent always spreads a wide net, when he announces an intended measure. The wishes and intentions of the Board of Trade are so well known, and, indeed, were described in our columns last week, that we need hardly quote the preliminary announcement of the provisions of the Bill about to be introduced: "Powers of Amal-" gamation; Definitions and Alterations of Capitals and Dividends; "Power to Raise Additional Capital; Alteration of Price of Gas; "Uniformity of Price and Purity of Gas;"—all these, we know, have been aimed at for some time by the Board of Trade. North of the Thames, these several objects may be said to have been secured by the spontaneous action of the companies concerned, now, in fact, only two in number. It remains for the Board of Trade to apply the same legislation to what we may call the *disjecta membra* on the south side of the river. The Metropolis Gas (Surrey Side) Bill proposes to deal with the London, Phœnix, Surrey Consumers, and South Metropolitan Gas Companies, and its object clearly is to put one and all under uniform regulations in every respect. They are to have the opportunity of amalgamating among themselves, and will find it to their interest to avail themselves of the chance; or they might perhaps more wisely determine to enter into a general metropolitan combination, which would best serve the interests of gas proprietors and of gas consumers. Beyond this, we know very well what the Bill means. The sliding scale, with the initial price of 3s. 9d. per 1000 feet, auction clauses, half share and half loan capital, and the rest, are what is in store for the southern companies. The vestries may remonstrate against uniformity of price; the Chairman of the Phœnix Company may shout for a guaranteed dividend of ten per cent.; but, if the Board of Trade are in earnest, we know very well what will happen.

The introduction of this measure will dispose at once of the Bill of the South Metropolitan Company and of that of the Board of Works. The company named will be only too happy to be relieved of a difficulty, and the Metropolitan Board will be delighted to see the regulation of metropolitan gas affairs taken out of their hands. Nevertheless, as we have said before, the Bill may not become law this session. It will if the Government push the measure; but we believe it is the desire of the Board of Trade to leave the southern companies, as far as possible, to arrange matters among themselves. They will probably have from now to next session to settle whether or not they will combine, but no mortal can tell how they will decide.

There is a sentence in the notice of the Board of Trade, which may mean nothing or a great deal. It says, that power will be asked "to alter and re-arrange, or transfer the district, or any "part, or parts, thereof assigned to the companies," meaning the companies mentioned above. What this may portend we cannot say until we see the Bill. According to information furnished to us, the terms are not yet definitely settled, and it is not printed. But something has leaked out, and it is easy to see through what crack. At the last meeting of the Lambeth Vestry, reference was made to the coming Bill, and the chairman quoted in so many words clause 15, which he said would enact uniformity of price in South London. No doubt the Board of Trade civilly submitted the first draft of the Bill to the Metropolitan Board, and through that channel the proposed provisions reached the Lambeth Vestry. It is, however, a matter of no consequence. The vestry may protest, petition, and engage one, or any number of counsel, in opposition; but "to this complexion they must come at last," and that means that they must accept 3s. 9d. as the initial price of gas. We shall reserve further comment until we have the Bill before us; but we may, in a word, once more urge the policy of amalgamation upon the southern companies. Any re-arrangement of districts must mainly concern the London Company, who may be said to have no less than three districts. We have before indicated how these may be disposed of, and need not here stop to point out again the reason why they should be divided between a northern and southern amalgamation; or, still better, be combined with one complete agglomeration.

The Bill of the Board of Trade will not at all affect the condition of things north of the Thames. The Chartered Company's Bill will pass without opposition, except as regards the little piece of land now belonging to the Board of Works. We expect the opposition will be futile, but, if it should be successful, it will be of no great consequence. According to present appearances, the Commercial Company will be allowed an independent existence, but that cannot be prolonged. They must, sooner or later, fall into the hands of the Chartered Company, and the sooner the better. On this point, however, we shall say nothing more.

[Since the above remarks were written, we have been favoured with a copy of the draft of the "Metropolis Gas (Surrey Side) "Bill," and are somewhat astonished to find that, though named in the Gazette Notice, the South Metropolitan Company will be excluded from its operation, and "left out in the cold." The exact terms of the measure are not definitively settled, and since the draft was printed, a large number of alterations have been proposed by the Metropolitan Board of Works. The measure was, we believe, discussed yesterday, at a meeting of the directors of the companies concerned, and before next week we shall probably know the result, and learn in what form the Bill will ultimately be introduced.]

A week ago to-day, Lord Elcho once more aired his oratory, such as it is, on the question of the Municipal Government of London. It was an evil day when Mr. Beal selected the noble lord as his organ. If Charles Buxton or John Stuart Mill had lived, the question of a municipal government for London might have had life; but in the hands of Lord Elcho it has become a corpse, very weakly galvanized. It is, however, a most important matter, and will become of still more importance—and some day a strong government will be compelled to take it into consideration.

The main part of the question, as to which, however, we hold a very strong opinion, lies beyond our purview. But it has often been said, in these columns, that, so long as the Metropolis wants a complete municipal organization, the gas companies, or, as we hope, the ONE gas company, will be safe in their, or its, monopoly. The late debate confirms us in this opinion, and further seems to show that the company will enjoy a long lease of the monopoly. It is passing strange, but the fact must be confessed, that the municipal condition of this vast Metropolis did not excite so much interest in the House of Commons, as did the finances of the bankrupt Corporation of Queenborough. The discussion was what the French would call *une affaire manqué*. Not an Alderman, nor an officer of the City of London—and we forget how many there are in the House of Commons—took any part in the debate. As regards the Aldermen, it may be said that they never do speak, unless questions of personal interest turn up—the Lawrences, when the taxing of house property is under consideration; and Alder-

man Lusk, when the shipping interest is concerned. For the officers, we need say little. The learned Recorder, no doubt, wanted a foeman worthy of his steel; and, since there was nothing of feminine interest concerned in the matter, the Common Serjeant probably found it agreeable to spend the evening at a tea-party with ladies anxious to marry their brothers-in-law. So it happened that Sir J. M. Hogg, the Chairman of the Metropolitan Board, was the only member, concerned in the administration of metropolitan affairs, who answered Lord Elcho. The worthy baronet is the most conspicuous failure we ever remember to have seen. Representing, as he may be said, in some sense, to do, four millions of the inhabitants of London, he sits for an insignificant and decaying Cornish borough, the political character of which we would rather not inquire into. We should be glad to say nothing about his speech. The only fact of interest that we gather from it is, that negotiations are on foot for the amalgamation of some of the South London gas companies. There is, we are happy to learn, a prospect of the speedy union of the Surrey Consumers with the Chartered Company.

But what shall we say of the Right Honourable Robert Lowe? We may confess that he has always been a puzzle to us, but never so much a puzzle as now. Perhaps he thinks, as we do, that he will not represent the University of London in another Parliament, and for that reason he is now holding out his hand to the University of Oxford. But we may tell him explicitly that untruth and inconsiderate expressions will serve him nowhere. *It is not true* that, during the twenty-five years in which Mr. Lowe has had a house or lodgings in London, gas has become higher in price and inferior in quality. If we took the trouble to follow Mr Lowe's migrations, we should certainly find that the price he pays for gas is now, at least forty per cent. less than it was twenty-five years ago. As regards the quality of this gas, we may admit that the gas put into the holder twenty-five years ago, estimated to be of the value of ten wax candles, has now the value of sixteen sperm candles, so much has the art of burning gas to the best advantage progressed. In other respects the progress is not inferior. Twenty-five years ago there were not, perhaps, less than eight or ten grains of ammonia and forty grains of sulphur in every hundred cubic feet of gas. To-day, there is no ammonia to destroy his gas-fittings, nor more than an average of twelve grains of sulphur to contaminate his atmosphere, and do the worst "sulphur" can do in his house. We refrain from remarking on personal matters, which make Mr. Lowe an imperfect judge of the quality of gas. Admiring his talents and courage, and, indeed, sharing many of his opinions, we lament when he strays from the paths of truth. He has not, by the speech he made, at all advanced the cause he professed to advocate. On the contrary, by his indiscreet and untruthful statements, he has delayed the progress of a reform which he, with ourselves, are anxious to promote.

It remained for the Home Secretary to make use of the most foolish argument adduced in the course of the debate. London, he said, was more a province than a city, and a councillor elected for one division or ward, might know nothing of the wants and wishes of a distant part of the Metropolis. This is utter nonsense, but it seemed to go down with the House, who kindly allowed Lord Elcho to withdraw his resolution, and thus laid the question of a Municipality for London at rest for another year—perhaps for many years. We may congratulate the gas companies, for without complete municipal government their continued existence is certain.

The Report of the Metropolitan Board of Works for 1875, just issued, narrates quite accurately the proceedings taken by the Board with reference to the gas question. But when we turn to the accounts, to see what these abortive attempts at legislation have cost the ratepayers of the Metropolis, we find ourselves confronted by the following extraordinary item:—"Establishment, law and parliamentary expenses, printing, compensation, allowance to late officers, &c., £63,296 6s. 2d." What an uproar there would be in Spring Gardens, and how much the able accountant of the Board would be exercised, if a metropolitan gas company published accounts in this fashion. We may, perhaps, get more explicit information when the return, ordered by the House of Commons, is printed; but we are very much afraid that document will not show the parliamentary expenses of last year.

The Town Council of Leeds have resolved to reduce the price of gas from 3s. 9d. to 3s. 4d. per 1000 feet, and have revised their scale of discounts. The announcement of the proposed alteration brought a deputation from the Chamber of Commerce to remonstrate against any change in the rate of allowances to large consumers. Not content with remonstrating, the Chamber threatened the Council with the erection of a multitude of small works, if they persisted. We presume the Chamber of Commerce will be satisfied with the new scale, which is entirely in favour of the large consumers, and gives nothing to those whose half-yearly bills do not amount to more than £15. We are altogether averse to discounts, except at a small and uniform rate to all consumers for prompt payment. If it be true, as one member of the Council asserted, that the large consumers, who have had discounts of ten and fifteen per cent., have been supplied at a loss, which must have been made good by the small consumers, the system in vogue was eminently unjust. For our own part, we agree with Mr. Scarr, that the best and most honest course a Corporation—and, we may add, a Company—can pursue, is to supply gas as cheaply as possible to all consumers, at a uniform price, and allow no discounts, except as mentioned above.

Another gas company is about to disappear. Arrangements have been made for the transference of the undertaking of the Horncastle Gas Company to the local authority. The price to be paid is that usual in the case of a non-statutory company—viz., $16\frac{2}{3}$ years purchase of profits; but as the sum will be a calculation on the profits of last year—the best the company have ever had—it will amount to about twenty years purchase of the maximum profits the company proposed in their Bill. The Committee of the House of Commons directed that the purchasing authority should, as usual, pay the costs of both sides, and also six per cent. on the purchase-money, if the bargain be not completed by September next.

The Corporation of Nottingham have resolved on making a reduction in the price of gas. They have differential rates according to the amount consumed, and the prices will now stand as follows:—3s. 2d. to small, 3s. 1d. to large, and 3s. to very large consumers, which is practically a reduction of twopence per 1000 feet all round.

The condition of things at Cambridge seems to resemble that at Exeter. The gas-works are complained of as a nuisance; but in and about the town are a large manure work, a soap manufactory, a candle factory, and, more offensive and poisonous than all, to our minds, a large brickfield. Yet the gas-works are fixed upon as the source of all the stenches that pervade the town. Perhaps, however, the Gas Company give most offence to the Town Council by asking, somewhat peremptorily, for the payment of a debt of £3000. It is astonishing how many senses are affected by a demand for money.

At Barnstaple, the Town Council get the public lamps supplied on some sort of average meter system, and it is complained that since the ratepayers have elected directors and friends of the Gas Company on the Council, the accounts have gone up in a most remarkable manner. The shorter the nights, the longer the gas bills. No doubt an explanation from the Gas Company will be forthcoming, and we shall wait for it before making any comments.

The recent meeting of the British Association of Gas Managers was most successful. The attendance was unprecedentedly large, and fifty-four new members were added to the roll of the Association. We give in our present issue the very sensible address of the President, some passages of which it will be well for members to take to heart. "The continued success of the Association," it was well observed, "depends very much on the number, but especially "on the character, of the papers read at the annual meetings;" and, we regret to learn, that it is only by personal application, and bringing some pressure to bear, that the committee are able to secure a sufficient number. This is not as it should be. There would appear to be no lack of papers to be read at the frequent meetings of the West of Scotland Association, or the North British Association, and why there should be a dearth in the case of the central society, which comprises members from all parts of the United Kingdom, we cannot imagine. We hope the Associations are not becoming too numerous; but, whatever may be the cause, it would be folly to attempt to conceal the fact, that, taken as a whole, the papers this year have been of less interest and importance than those read at any previous meeting of the Association. The visit to Beckton was highly interesting. Most of the members, no doubt, saw for the first time the Steam-Jet Exhauster at work, and every one must have been convinced of the justice of the reward of the President's Medal to Mr. Cleland, of Liverpool, who, if not the actual inventor of this exhauster, was the first to adapt it for use in gas-works. This form of exhauster will probably supersede all others in large works. Its simplicity, regularity of action, and economy, are sufficient to recommend it; but, beyond these advantages, it seems to have been proved at Silvertown, as well as at the Linacre works, Liverpool (not to mention several works in Germany, in which it is employed), that there is a distinct gain in illuminating power where it is used. The members also saw the arrangements, now in progress, for putting Mr. Foulis's "hydraulic stoker" to work. These, we apprehend, will be perfect, and will obviate all the objections hitherto brought against the use of the machine. In a description of the working of the two inventions here alluded to, Mr. Trewby will find the materials

for two instructive and valuable papers for the next meeting of the Association. We must mention that the members were cordially received, and conducted over the works, by the Hon. Howe Browne, the Governor of the Chartered Company, F. J. Evans, Esq., and Messrs. Trewby, Wyatt, and T. J. Bush. A visit to Rosherville concluded a "happy day."

Water and Sanitary Notes.

A perusal of the Rivers Pollution Bill, now printed, convinces us that the Government have no serious intention of forcing it through Parliament this session. It is, in our opinion, a hastily-drawn and ill-considered measure. It will not satisfy sanitarians and riparian proprietors, and it may even, as it stands, cause annoyance to manufacturers, and possibly to local authorities. It is true that the chances of annoyance are diminished to the utmost. If the Bill should pass, no proceedings can be taken before twelve months have elapsed after the passing of the Act; and even then, two months notice must be given before the proceedings are instituted. Moreover, none can be taken but by an "authority," with the consent of the Local Government Board, who will have power to suspend the proceedings for an unlimited time, on the certificate of an inspector, stating that the best and only available means have been adopted for rendering sewage or manufacturing and mining refuse harmless. Thus, this measure, if it should pass, will remain practically a dead letter. And yet some alteration in the law is imperatively demanded. We read, in a Glasgow paper, that an interdict from the Court of Session has recently had the effect of closing a large print-work, employing some hundreds of hands, the refuse from which killed a few trout in a mountain stream. Other actions, the same paper informs us, are pending, which may have a like result. The manufacturers cannot remain at the mercy of the landowners. We are not yet quite rid of feudal law. An interdict, or an injunction, can still throw some hundreds of hands out of employ, and render thousands of pounds of capital profitless. This state of things must be altered, and if this Bill would effect the desired change, we would gladly see it pass; but we are afraid, however, that it would leave matters much as they stand, and the relative claims of capital and labour, and trout and salmon, will still have to be settled.

We are rather sorry to see that the Wakefield Water Company have refused another offer from the Corporation to take over their undertaking, and so save all further expense. The terms offered, it is true, were by no means liberal. They were, £48 for every £25 share, and £24 for each £12 10s. share. It would seem that the company agreed with the Corporation as to the price to be paid for the old shares; but the directors asked for a further sum of £30,000 for the new £10 shares issued to meet parliamentary expenses; making, in all, a sum of £160,000. The Corporation first offered to meet the company half way with the new shares, and subsequently increased their offer by another £10,000, making £25,000 out of the £30,000 asked by the directors. This was refused, and, consequently, the strife will go on in the House of Lords. It is lamentable to think of the money squandered in these parliamentary contests. Here is a company saddled with £30,000 of unproductive capital, and the actual expenditure must, we fancy, have considerably exceeded this sum. What the Corporation have expended we have no means of knowing.

Testimonial to Mr. John Clark.—On the 29th ult., the stokers at the Shoreditch station of the late Imperial Gas Company, presented to Mr. John Clark a handsome gold watch, made by Mr. Frodsham, of Gracechurch Street, accompanied by the following address:—"We, the undersigned workmen, in the employ of the Imperial Gaslight and Coke Company (Shoreditch station), desire to express our respect for, and our appreciation of, the uniform kindness and consideration which we have always experienced from you during the time we have had the pleasure of working under you; and, as you are now retired, we take the liberty of presenting you with a gold watch, which we beg you to accept as a token of our respect and best wishes for your future welfare.—Dated this 29th May, 1876."

Underground Pumping-Engines.—At a meeting of the Society of Engineers, on the 12th inst., a paper by Mr. Henry Davey, on the underground pumping machinery at the Erin Colliery, Westphalia, was read. It described what is probably the largest example of underground pumping-engines extant. The system, which was originated by the author, may thus be briefly described. In the mine (which is 1200 feet deep), 920 feet from the surface, is placed a pair of compound differential pumping-engines, capable of raising 1400 gallons per minute to the surface, at the same time supplying power, through the medium of the rising column, to two differential hydraulic pumping-engines, placed at the bottom of the mine, and employed in lifting 1000 gallons per minute to the main engines. Steam is carried down to the main engines, from the surface, at a pressure of 70 lbs. per square inch. After passing through the engines it is condensed, and a vacuum of from 24 to 26 inches of mercury is obtained by means of a separate condenser, which produces at once the vacuum on the engine, and enables it to start to work against the full column. The methods of actuating the valves in the steam and hydraulic engines were fully shown. In the latter case, the valves are worked without any metallic connexions, by means of a modification of the differential gear. The paper was illustrated by detail drawings of the steam and hydraulic engines, and also of the separate condenser, as well as by working models of the machinery.

Correspondence.

MR. ROBERT LOWE AND THE QUALITY AND PRICE OF LONDON GAS.

Sir,—In the debate, on Tuesday last, in the House of Commons, on the resolutions of Lord Elcho, in favour of improved Municipal Government in the Metropolis, Mr. Robert Lowe, the one-time Chancellor of the Exchequer, is reported to have said that "ever since he had been a householder in London" (something more than 25 years) "gas had been getting worse in quality and higher in price, the chief reason being," &c. —never mind his reasons; they are no better founded than his alleged facts.

I have lying before me an "Address of the Chairman of the Great Central Gas Consumers Company to the Gas Consumers of the City of London," dated Dec. 16, 1861, and quoting at length a joint certificate of Professor Graham, Dr. Leeson, and Mr. Samuel Clegg. It states that "we would consider an illuminating power equal to 9¼ sperm candles of our standard (131·5 grains sperm) as a high average for the gas supplied at present by the different companies to the City consumers, and would, therefore, suggest that it should be adopted by your company as the standard of comparison for the gas to be supplied by Mr. Croll."

The address goes on to say that the Metropolis Gas Act of 1860 makes it compulsory on all the companies in the Metropolis to supply gas of a minimum illuminating power of 12 sperm candles, under heavy penalties. All your readers know well whether this has been done, and also that only one penalty has been incurred, and that because of an accident unique in itself.

I have thought it might be worth while noticing Mr. Lowe's wilful ignorance, because there is a general impression among the public that even ex-Cabinet Ministers always tell the truth. An Ex-C. I.

GAS PURIFICATION.

Sir,—After reading Mr. Vernon Harcourt's letter, in your last issue, and noting that portion where he says, "the second process aimed at, removing sulphuretted hydrogen by water holding oxide in suspension," &c., I thought I would just mention what was done at the City of London Gas Company's works more than twenty years ago.

In those days we were using the wet lime process only, and were getting into great difficulties respecting it, because of our proximity to the river. The only way of escape appeared to be by dry lime alone, the value of the oxide of iron being then only partially understood. Many suggestions were offered, one of which was by Mr. F. C. Hills. He proposed that, before erecting new and costly apparatus for dry lime or oxide of iron, we should try the oxide mixed with water, and used in the wet lime purifiers, in a similar manner to lime. Consequently, an order was given for a trial on a practical scale. A large mixing vat was erected at a height above the purifiers, in which to mix the oxide and water, and connexions were made therein from two sets of wet lime purifiers, each set composed of three vessels 10 feet in diameter. A portion of the coke floor of one of the retort-houses was set apart for running the sulphuretted iron and water on to, in order to separate the one from the other, for the purpose of renovating the iron before returning it to the vessels for further use. This arrangement was put to work, but I need not trouble you beyond remarking that the oxide, when mixed with so much water, was found so deficient in activity as to be worthless as a purifying agent, and had we then known as much about oxide of iron as we do now, we should not have spent so much time in proving that iron, when sulphuretted and made into a layer of *mud*, was not in a form to take oxygen, and become again fit for use within any reasonable space of time. These difficulties were very disappointing, but knowing that the time for parting company with our old friend, Father Thames, was near at hand, and also knowing that, situated as the works were, any attempt to use, as had been suggested, the precipitated "blue billy" as luting for the retort-lids, would only tend to make matters worse; no time was lost in erecting two sets of purifiers for dry lime, one set of four, 24 feet by 18 feet and 7 feet deep, and another set of four, 18 feet by 16 feet and the same depth. To these were attached the necessary connexions and apparatus for ventilating or desulphuretting the fouled lime according to the plan patented in 1853. This process was successful, and although it was, and perhaps is, the best means for deodorizing foul lime, I was obliged to resort to the use of the oxide of iron, the reasons for which at this date need not be given. The ventilating apparatus, nevertheless, did good service in the end, as regards the sanitary condition of the works, being used to pump out the foul gas and replace it with purified, before lifting the covers of the purifiers for removing the spent charge. In a sanitary sense, this arrangement was of great value, and would be worth the attention of those who have any trouble in this direction.

June 19, 1876. W. Mann.

Parliamentary Intelligence.

HOUSE OF LORDS.

Tuesday, June 13.

The Chairman of Committees informed the House that the opposition to the Whitehaven Town and Harbour Improvement Bill was withdrawn.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to Rosstrevor Improvement and Plymouth Dock (Devonport) Water Bills have been complied with; and that no further Standing Orders are applicable to the following bills:—Smethwick Local Board, Newcastle and Gateshead Water, Southampton Gaslight and Coke, Wakefield Water, Colney Hatch Gas, Burntisland Burgh, Norwich (City) Water, Dunfermline Water, Oldbury Local Board of Health.

The following bills were read a second time, and committed:—Bristol United Gas, Dewsbury and Heckmondwike Water, Spennymoor and Tudhoe Gas.

The following bills, brought from the Commons, were read the first time and referred to the Examiners:—Cleveland Water, Campbeltown Burgh and Harbour, Kirkcaldy Burgh and Harbour, North-East Worcestershire Water, South Metropolitan Gaslight and Coke, Uppingham Water, Sevenoaks Gas, Southport Improvement, West Bromwich Improvement, Horncastle Gas, Tipton Local Board.

The Galashiels Municipal Extension, Police, and Water Bill was returned from the Commons agreed to, with amendments, which were considered and agreed to.

Petitions against the following bills were presented:—Burntisland Burgh Bill, from (1) The Earl of Moray, (2) John Wilson, (3) William Wotherspoon;

Dewsbury and Heckwondwike Water Bill, from (1) Corporation of Batley, (2) Thornhill Local Board of Health, (3) Soothill Upper Local Board of Health; The Gaslight and Coke Company Bill, from (1) Metropolitan Board of Works, (2) London and Saint Katharine Docks Company; Halifax Water and Gas Extension Bill, from Henry Savile; Lancaster Water and Improvement Bill, from (1) Lancaster Union Rural Sanitary Authority, (2) Vestry of Scotforth, (3) Poulton Bare and Torrisholme Local Board of Health, (4) John Gordon M'Minnies, (5) James Ormrod and others; Oldbury Local Board of Health and Smethwick Local Board Bills, from the Corporation of Birmingham; Spennymoor and Tudhoe Gas Bill, from Robert Tindale; Wakefield Water Bill, from Corporation of Wakefield.

Petitions against alteration in the Halifax Water and Gas Extension Bill were presented from (1) Brighouse Local Board, (2) Hebden Bridge Local Board; and in the Newcastle and Gateshead Water Bill, from John Giffard Riddell.

THURSDAY, JUNE 15.

The following resolution, reported from the Standing Orders Committee, was agreed to:—"That the Standing Orders not complied with in respect of The Gaslight and Coke Company Bill ought to be dispensed with, and the bill allowed to proceed."

The South Hants Water Bill was reported, with amendments.

The Tunbridge Wells Gas Bill was read a second time, and committed.

Petitions against the Stockton and Middlesbrough Corporations Water Bill were presented from (1) Kingston-upon-Thames Gas and Coke Company, (2) Mitcham and Wimbledon District Gaslight Company.

The Kildwick Parish Gas, Stockton and Middlesbrough Corporations Water, and Spennymoor and Tudhoe Gas Bills were referred to a select committee, consisting of Lord Cottesloe (chairman), Lord Bagot, Lord Heytesbury, Lord Claremont, and Lord Hanmer; to meet on Monday, June 19.

METROPOLIS GAS COMPANIES ACCOUNTS.—The accounts of the metropolitan gas companies for the year 1875, in compliance with the Metropolis Gas Act, 1860, the City of London Gas Act, 1868, Imperial Gas Act, 1869, and the South Metropolitan Gaslight and Coke Company's Act, 1869, were presented.

FRIDAY, JUNE 17.

The Slaithwaite Gas Bill was reported, without amendment.

The following bills were read a second time, and committed:—Rosstrevor Improvement, Smethwick Local Board, Newcastle and Gateshead Water, Southampton Gaslight and Coke, Oldbury Local Board of Health, Plymouth Dock (Devonport) Water, Colney Hatch Gas, Burntisland Burgh, Norwich (City) Water, Dunfermline Water.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the Sevenoaks Gas and Uppingham Water Bills have been complied with; that no further Standing Orders are applicable to the following bills:—Halifax Water and Gas Extension, Southport Improvement, South Metropolitan Gaslight and Coke, Cleveland Water, Campbeltown Burgh and Harbour, Kirkcaldy Burgh and Harbour, West Bromwich Improvement, Horncastle Gas, Tipton Local Board; and that the further Standing Orders applicable to the North-East Worcestershire Water Bill have not been complied with.

The Huddersfield Water and Improvement, Dewsbury and Heckmondwike Water, Smethwick Local Board, and Oldbury Local Board of Health Bills were referred to a select committee, consisting of Lord Strafford (chairman), the Duke of Grafton, Earl Verulam, Viscount Leinster, and Lord Raglan; to meet on Tuesday, June 20.

A petition against the South Metropolitan Gaslight and Coke Bill was presented from the vestries of Camberwell and Lambeth.

HOUSE OF COMMONS.

MONDAY, JUNE 12.

The Lords amendments to the Chesterfield Water and Gas, and the York New Water Bills, were agreed to.

The following bills were read the third time, and passed:—Galashiels Municipal Extension, Police, and Water (Lords), Sevenoaks Gas, Southport Improvement, West Bromwich Improvement.

The Horncastle Gas Bill, as amended, was considered.

The Gas and Water Orders Confirmation Bill (Lords) was read the third time, and passed.

A petition against the Llandudno Improvement Bill (Lords) was presented from the Trustees of the Mostyn Estate.

TUESDAY, JUNE 13.

The Blackrod Local Board Bill (Lords) was read a second time, and committed.

The Tipton Local Board and Horncastle Gas Bills were read the third time, and passed.

MUNICIPAL GOVERNMENT OF THE METROPOLIS.

SUPPLY OF GAS AND WATER.

Lord ELCHO moved two resolutions on the subject of London Municipal Government—first, that the reform of the Government of the Metropolis is a question which deserves the early attention of Her Majesty's Government; and, secondly, that such a reform should be based on the establishment of one municipal administration for the whole Metropolis. In doing so, he said he joined issue with the President of the Local Government Board, who, in an after-dinner speech a few years ago, spoke of London as the best governed city in the world. He would apply to the right hon. gentleman's assertion the test of pure air, the gas and water supply, and the arrangements for extinguishing fires. The tests of good municipal administration were that the air should be made as pure as possible by good sewage and the removal of effluvia and impurities; that the water should be pure and the supply constant, and not intermittent, and sufficient for keeping the streets cleansed. There should also be the ready means of speedily extinguishing fires. There ought, moreover, to be an abundant supply of gas, pure, and at a reasonable price. The streets should be well lighted; the markets should be readily accessible, and in convenient localities; the police should be efficient; the poor should be properly taken care of, while vagrancy and mendicity were suppressed; and the houses should be well constructed. Finally, there should be unity of administration and direct representation—that was to say, those who spent the money should be directly responsible to those whose money they spent. No doubt, if they compared the present state of the Metropolis with what it was in 1855, when the Metropolitan Board of Works were established, a great improvement had been effected. There were, at that time, no less than 150 local corporations levying rates and tolls. The Metropolitan Board had carried out a great scheme of main drainage, but the vestries were still responsible for the minor sewers, and there was not sufficient controlling power on the part of the Metropolitan Board to insist on the minor drainage being carried out. There were now 6000 miles of sewers constructed, but there was still a divided authority. The Thames Conservancy, which made the regulations relating to the river were a different body from the Metropolitan Board, and they complained that the outfall of the main drainage had not been placed lower down the river, and that it interfered with the navigation. Last year he put a question to the chairman of the Metropolitan Board of Works, which showed the want of control on the part of that body. In hot and dry weather all macadamized streets had an intolerable smell; and he asked his hon. and gallant friend (Col. Hogg), whether he would take care that the streets should be properly watered and uniformly cleansed. The hon. and gallant member replied that the Board had no power to compel the vestries to wash and cleanse the streets. Take, again, the supply of water. Various commissions had reported that it was essential that water for drinking purposes should be taken from springs, and not from rivers. They declared that there was no river in England of sufficient length to free the water from the impurities of any sewage that might be poured into it, yet the sewage of 1,000,000 persons entered the Thames above the point from which the water for the supply of the Metropolis was taken. Notwithstanding the report of the Rivers Pollution Commission, the metropolitan water supply was taken from the river, and the system of supply was intermittent instead of being constant. Whenever the supply was intermittent, the water must be stored, and the London water was kept for the greater part in open butts, where it contracted impurities very hurtful to health. The poor suffered more than the rich from this system, but, although Manchester and other towns had adopted the system of constant supply, the Metropolitan Board had done nothing to secure it for London. It appeared from the report of the Metropolitan Board for 1872, that they had abstained from calling upon the water companies to give a constant supply. The question had come before the committee now sitting on the means provided for the extinction of fire in London, and it appeared that the non-existence of constant supply and of fire hydrants in London involved three deaths, three cases of personal injury, and three bad fires, to one of each in Manchester, which was provided with hydrants and had a constant supply. It was essential that water should be made immediately accessible for the extinction of fires, because the difference between obtaining it in five minutes and waiting fifteen minutes made all the difference between extinguishing a fire in the building in which it originated, and simply preventing its extension to surrounding structures. Of course, hydrants would be of no use without constant supply. If the Metropolitan Board had power to compel the provision of both, why did they not exercise it? and if they had not power, why did they not seek to obtain it? There ought to be in London, in respect both of water for drinking and water for extinguishing fires, advantages equal to those enjoyed by Manchester and other towns. It had been represented that the introduction of constant supply into the whole Metropolis would involve a total cost of 4 millions; but the experience of Manchester and other towns, as collated by the committee of the Society of Arts, showed that the cost of the necessary changes need not exceed 10s. a house. He trusted the House would consider that expense ought not to stand in the way of a prime necessity for the health of individuals and the safety of life and property. He trusted the committee who were considering the question of the extinction of fires would pay some attention to the cognate question of the construction of houses in reference to which the Metropolitan Board were the local authority. In reference to the supply of gas, there was no local authority, and it was the opinion of Mr. Fitzjames Stephen and others that in what the Metropolitan Board had done for the benefit of the public, they had allowed zeal to outrun their powers. When the shops were shut, the Metropolis compared unfavourably, as regarded lighting, with other cities, and reminded one, in fact, of the *monstrum horrendum, informe, ingens, cui lumen ademptum* of the poet. In winter many streets were ill-lighted when the shops were closed, and recently the pressure was so weak that the lights went out in his own house—an occurrence involving the risk of danger everywhere, through the escape of gas where it was not relighted when the pressure was renewed. The practical action that was the first taken, and that resulted in the legislation of 1860 and 1868, was taken at the instance of individual ratepayers; and there was reason to hope that now the amalgamation of the gas companies would facilitate the purchase of their works by the municipal authority. After referring to the management of the streets, and the privileges of the corporation in respect to the establishment of markets, his lordship, basing his observations upon Mr. Firth's statements, proceeded to point out the costliness of the present state of local government in the Metropolis. He had seen it stated that the annual loss to the Metropolis for want of better administration was something like £250,000, and if the same management as to gas and water were exercised in London as in Manchester, the saving might be £500,000 per annum. It could not be said that the financial affairs of London were economically administered. His lordship then gave an historical sketch of the various attempts at reform, and said his object in making his motion was to pave the way for the creation of a new municipality for the Metropolis, by extending the boundaries of the City, so as to include the "Greater London Without;" and he showed, by numerous quotations, that that had been the basis of all projects of municipal reform since 1839.

Mr. NEWDEGATE maintained that the condition and administration of the Metropolis were undergoing a constant course of improvement, which he hoped the Government would not interrupt.

Sir J. HOGG defended the administration of his Board and of the vestries, and though he admitted some reform might be necessary, such a sweeping change as this was out of the question. With regard to hydrants, the matter was now being considered by a committee upstairs, but he might state that the Metropolitan Board were introducing them wherever they could be usefully placed. His noble friend had talked about the zeal of the Metropolitan Board of Works having outrun their discretion in the gas question, but he might state that the action of the Board had already borne fruit. Though he had not been able to pass the gas bill which he introduced last year, and which was again before the House this year, that measure had already led to the amalgamation of all the gas companies except one on the north side of the Thames, to negotiations for the amalgamation of those on the south side, and to the adoption of all its more important provisions.

Sir G. BOWYER argued that a municipality such as Lord Elcho would set up would be too unwieldy. It would be a kingdom in itself, its council would be a parliament, and in time it would become a political and factious body.

Mr. LOWE remarked that the question to be discussed was not the dignity of the Corporation of London, but why the 3,600,000 people outside the City should be deprived of the advantages of municipal government enjoyed by the other large towns of the kingdom. The inhabitants of London lived under the jurisdiction of vestries, and if they inquired into the evidence they would find that it was not at all difficult for fussy, incompetent persons to push themselves into these bodies. They had, no doubt, useful functions to perform; but their powers were very much limited by the narrow area over which they extended. There was a constant system of doing and undoing. A road was laid down to be afterwards picked up. Each of these must have a lot of advisers, and imagine the waste of having 20 or 30 sets of people to do different work which might all be done under one single competent command. He did not wish to speak disrespectfully of the vestrymen; but the vestries were generally composed of small tradesmen, to whom money and time were of great importance, who had a narrow education, and who were not fitted to discharge duties of this kind. The affairs of the Metropolis had quite outgrown the system which prevailed. It was absurd to call the vestries municipal government; but he thought it was greatly to be wondered at that the system was not worse than it was. They were continually told of the direct election of the vestries; but the honourable and gallant member opposite and his colleagues were elected by vestries who were appointed nobody knew how or when. To the vestries elected as he had described were entrusted the municipal functions of the Metropolis. Now, if this was the right principal, why not apply it all over the United Kingdom? Why were not Manchester, Glasgow, Edinburgh, and Birmingham governed in this manner? Why did little vestries swarm in the Metropolis? In what respect were the people of the Metropolis inferior to the cities he had named that they should submit to this system of government, which was contrary to English notions and feelings? Why were 3,600,000 people

here to be made an exception to the whole kingdom? That was really the question, and it was a question of the utmost importance, demanding an answer different from any that had been given to it. London was cut up into little petty districts, controlled by little petty boards, and time was frittered away in electing small bodies with limited powers. He had fairly described, he believed, the condition of the outside district of the Metropolis, and, if the statement was anything like fair, they could not be surprised that the fruit was very much like the tree. The Metropolitan Board had borrowed 15 millions, and raised 5 millions by taxes, and it would be strange if, having 20 millions, they did nothing with it; but they illustrated one thing clearly, and that was the source, the system, in which they had their being. He thought that the system under which they were elected was about as bad a form as could be devised by human ingenuity. Yet, in spite of these disadvantages, the Board were able to perform considerable public work and service. Nothing was more remarkable than the want of public spirit, and of the power of defending themselves, possessed by the 3,600,000 inhabitants of London. They were continually trampled on in the most ignominious manner because they had no organization by which to assert their rights. There was plenty of political life among them, but the absence of a municipality had produced its natural effect, just as the loss of an organ in the human body led to a corresponding want of expression; and now there was no body so small or petty which could not trample upon those 3,600,000 people—

"Point but a rush against Othello's breast,
"And he retires."

Take the case of gas. There was not a town in England which would submit to be treated as London was treated in its gas supply. Ever since he had been a householder in London gas had been getting worse in quality and higher in price, the chief reason being that a number of London gas companies had more power to carry their bills through the House of Commons than was possessed by the 3,600,000 people they supplied, and step by step they had established a barefaced and gross monopoly. Then take the case of water. What was the greatest insult which one human being could offer another? If one man compelled his neighbour to drink his sewage, the latter was put about as low as he could be put. Yet this was precisely the position of most of the inhabitants of London. He enjoyed the blessings of a water supply from the Chelsea Water Company, and could hardly take up a newspaper without reading about the large proportion of animal organisms in the water so supplied to him. This meant that all the towns on the banks of the Thames above the Metropolis were discharging their sewage into the river, and that the people of London were forced to drink the water so defiled. Did anybody believe that if the Metropolis had a proper municipal organization it would be subjected, he would not say to such an insult, but to such a danger, and such a disgrace? Yet the people of the first city in the world were subjected to an insult which no decent master would offer to his slave. These were two instances of the want in London of that which all the rest of the world enjoyed—representation by a municipal council. The question was, what remedy should be applied? It appeared to him that the remedy for this state of things was a municipality embracing the whole of the Metropolis, and he urged the Corporation to place themselves at the head of the movement. He did not speak in antagonism to them, but if they chose to stand apart it would be for Parliament to consider whether that circumstance should be allowed to stand in the way of granting what was right and just to the rest of the Metropolis. All he urged was that the adoption of this motion did not pledge the House to any course which was hostile to the Corporation of the City of London; but the inhabitants of the rest of the Metropolis had a right to be placed in the same position with their fellow-subjects in all the other parts of the kingdom, and to be enabled to manage their own affairs in the same way as they did.

Mr. CROSS admitted that from one point of view, and as an abstract proposition, there was much to be said in favour of the first resolution; but the second was not to be dealt with so summarily as had been suggested. He was well aware that there was great reason for grumbling with the arrangements for the supply of gas and water and the state of the streets; but he denied that the establishment of a central authority would ensure a remedy. London was not like Manchester or Liverpool, or any city on the Continent. It could not be treated as a municipality, for it was a province covered with houses, without common interests, and with no connecting link between east and west and north and south. In fact, the two first conditions of municipal government were wanting, namely, community of interests and minute local knowledge. Another obstacle was the possession by the City of London of numerous ancient charters and privileges, and if the municipal government were extended to the whole Metropolis those charters and privileges would be destroyed. If he were asked what the Government meant to do in the matter, he replied that they did not intend to follow the example of their predecessors in office by bringing in a bill and then dropping it. No doubt the House would before long have to deal with the question whether an improvement could not be made in the government of the Metropolis, but all he could say then was that there were many grave questions which would have to be taken into consideration first.

After some remarks by Mr. CHARLEY,

Lord ELCHO having signified that he was content with the admissions made by the Home Secretary, withdrew his motion.

THURSDAY, JUNE 15.

The Gas and Water Orders (Chapel-en-le-Frith, &c.) Bill (Lords) was read the first time.

FRIDAY, JUNE 16.

The Lords amendments to the Gorleston and Southtown Gas Bill were agreed to.

BURGHS (SCOTLAND) GAS SUPPLY BILL.—This bill was read the third time, and passed.

HOUSE OF COMMONS COMMITTEE.

MONDAY, MAY 1.

(*Before Mr.* ORR-EWING, *Chairman*; *Col.* RUGGLES BRISE, *Lord* RENDLESHAM, *and Mr.* BROGDEN.)

STOCKTON AND MIDDLESBROUGH WATER BILLS.

(*Continued from page* 905.)

Mr. *Robinson* recalled, and examined by Mr. SOMERSET.

On Saturday last I made further borings at the site of the corporations reservoir, and found water flowing profusely, besides which quantities of sand were brought up. The water at the point previously mentioned was still flowing. I found sand at 4 feet below the place where it was found before, and that confirms my impression that it is extensive, and goes to a dangerous depth.

Cross-examined by Mr. VENABLES: I did not measure how many feet we went down before we came to sand at all. I cannot tell how it was we found sand now in a place where it was not found before. We had probably underestimated on the former borings. The sand was very wet, and we did not find any hard beds. It is not probable that the sand found had fallen from the surface.

Mr. *Jackson* recalled, and cross-examined by Mr. VENABLES.

I advised the Liverpool and Bolton Corporations in the execution of their water-works; but they have been short of water sometimes. There has been a great waste of water at Liverpool through the old fittings being defective. The people of Liverpool and Bolton have every reason to be satisfied with the way in which the works are now managed. The reservoirs there are on boulder clay, and that is a good foundation if it be continuous; but it is generally broken up by faults. It is always very patchy in Lancashire, with which I am more particularly acquainted. Near the Grassholm site I saw the limestone coming up to the millstone grit; but it was outside the drainage area, as marked on the plan. Limestone is quarried between the Grassholm and Hury reservoirs sites. I am sure the boulder clay is not continuous at the Grassholm site. I have no doubt that the sand found at the borings came from below, and did not fall from the upper bed of gravel. I am not aware there are two seams of boulder clay, an upper and a lower, nor do I know that while the upper seam is faulty, the lower one is continuous; but I know that in the valleys I always find the boulder clay faulty. At the Haslington reservoir we did not know of the existence of the 10 feet of sand until we came down to it. If the water had not boiled up on a pipe being driven in, we should have made the reservoir on that site. I do not know if the millowners and others interested in the water rights are satisfied with the compensation to be given by the corporations, but the company have nothing to do with it. The practice of Parliament is to give one-third of the rainfall; but that is not for the millowners protection, but for the riparian owners down the river. In some cases money compensation has been given instead of water.

Re-examined by Mr. SOMERSET: I have no reason to believe that the boulder clay here will behave any better than it does in other places where I have met with it. It was impossible that a cartload of sand could fall down the borehole and be brought up again. It would be very costly to dig all the sand out or sink a trench in that valley, for they are never secure against floods in such a country.

Mr. *James Farrer*, examined by Mr. SOMERSET.

I am a civil engineer, residing at Bury, Lancashire, and was engaged with Mr. Jackson in the construction of the Haslington reservoir. It took ten or eleven years to complete, and the company had to get extended time and additional capital from Parliament. The original capital all went, and the shareholders never received a dividend. It was a very promising scheme until we opened up the puddle trench. In the end the company sold the works to the corporation. Compensation is never less than one-third of the available rainfall, and that is a fair quantity to be given. I have seen sewage going into the Tees at Barnard Castle, but at the company's intake I could not trace it at all. I could find no difference between the colour of the Tees water and that of the Balder and the Lune. The company's works are clean and orderly, and their filtering apparatus will be quite sufficient when completed. I examined the sites of the proposed embankment and saw the borings. I saw water issuing from two holes. I agree with Mr. Jackson, that the site is a very bad one on the south side of the Lune, as it is clay which has slipped from a higher level, and is not sound. The embankment would be dangerous, and no one could tell the exact cost of it. If the reservoir were built the embankment might give way, all the water rush out, and the people living below would be drowned.

Cross-examined by Mr. VENABLES: I have heard that last year the company proposed to take an unlimited quantity of water from the Tees without giving any compensation. I do not know whether compensation is given for the water taken from the Thames; but that would not affect the question, as the Thames is a river, while the Lune is only a limited stream. If the company were to take 30 million gallons more a week they ought to give compensation.

Re-examined by Mr. SALISBURY: The drainage area of the Tees at Tees Cottage—the company's intake—is immensely larger than that of the Lune. While compensation is enforced by Parliament in the case of water obtained from gathering-grounds, it is not so with respect to water pumped out of rivers.

Mr. *Thomas Forster*, examined by Mr. SALISBURY.

I am a civil engineer, and have had great experience in the construction of water-works in Lancashire and Yorkshire. I have seen the site of the corporations reservoir and the various bore-holes made, and come to the conclusion that it is not a desirable site, unless they go through the sand. A puddle trench should always go through the boulder clay, and come either to shale or rock. The compensation water given ought to be 16 million gallons, whereas it is only proposed to give 9 millions.

Mr. *Abernethy* recalled, and examined by Mr. SOMERSET.

I have examined the company's works, the plans of the corporations, the sites of the proposed reservoirs, and the country around. I examined the water of the Lune and the Balder, when taken in flood, and found it was not in a proper state for use. Where the Balder joins the Tees, the latter was the clearer, and at Tees Cottage the water was in good condition. The company's works are in an excellent state, and the filters, when finished, will be quite sufficient. With a diminishing demand for water, it would not be wise for the corporations to expend so much money as they propose by their bill. The company can carry on for many years with their present supply, if steps be taken to prevent waste. The corporations scheme could not be carried out for the sum mentioned in the estimates, on account of the Grassholm reservoir being likely to turn out a costly one. The 30 million gallons a week extra, which the company propose to take from the river, would not affect its scour at all, nor its navigable capacity in the slightest degree. The Tyne and the Clyde have been deepened by dredging and by the tidal force, not by more water coming down the rivers.

Cross-examined by Mr. VENABLES: The company's bill is to add 50 per cent. to their water supply, but I think that additional quantity is not required; at all events, there is no urgency about it. No compensation is proposed to be given to the river for what it is proposed to abstract. I attach no importance to any scour but that of the tidal flow.

Mr. *William Pole*, examined by Mr. SOMERSET.

I am a civil engineer, Vice-President of the Royal Society, and was secretary to the Rivers Pollution Commission. Last year and this I visited the Tees district with the special object of giving evidence on the company's bills. The average winter supply by the company is 47 million gallons a week, while the summer average is 50½ millions. The domestic supply is just under 21½ million gallons in winter, and 24½ millions in summer each week, or 24½ and 28 gallons respectively per head of the population. It is not desirable to stint the domestic supply, and it is found that generally more is wasted than used. There is a great deal of water wasted in this company's district. The fittings are in good order in Stockton, and, therefore, there is little wasted in the houses, so I fancy some of the mains must be broken, and the water runs away through the slag. About 1½ million gallons are unaccounted for, and this quantity can be saved with care. In Norwich the supply is only about 10 gallons per head, in Manchester 13 gallons, and in Sheffield about the same. In my house the consumption is not more than 12 gallons per head each day, though I have a bath in use. I do not believe the Tees is fouled from the villages on the upper part of the river. At the four places which send sewage into it, I found scarcely any traces except at Barnard Castle, where the pipe opened under the water, and I could not see how much sewage flowed through it. On examining the river there was no evidence of fouling, and there could be nothing like 1,000,000 gallons of sewage a day passing into the river, but there might be about 30,000 gallons, which would not affect the quality of the water at a little distance, for it would all be oxidized. The workings from the lead mines do no harm, for any ore that gets into the water is not soluble. The water is now brought down to the towns of Stockton and Middlesbrough, and I do not see why, at a great expense, the supply should be taken from farther up the river. The

company will require extensions of their works if the demand for water increases, and all they will then want will be money to carry them out.

Cross-examined by Mr. VENABLES: I believe the company intend to carry out the works if they get their bill, but they can go on without them, except so far as the additional supply to Normanby is concerned. There is a different opinion this year as to the iron trade increasing, from that which was expressed last session.

Re-examined by Mr. SALISBURY: Even if the towns require more water, there is no necessity for the corporations going to the expense they propose, for providing it.

TUESDAY, MAY 2.

Mr. *John Ayris*, examined by Mr. SOMERSET.

I am a civil engineer, residing at Norwich, the water-works of which place I designed, and have had great experience in the construction of such works. I have visited Stockton and Middlesbrough on two occasions. I found the population actually supplied was 135,000. For domestic supply there were 23 gallons per head per day in winter, and 27 in summer, or a total of 6½ and 7½ million gallons respectively per day for seven days a week. That quantity is very excessive, and far beyond the supply to any other town I know of. The highest is about 14 gallons per head per day, and the average about 11. I saw there was a good supply, both as to quantity and quality, and I think there must be a good deal of waste. We check waste at Norwich by night inspection, and that system is being adopted in Glasgow and other places. I examined the company's pumping-station, and found everything in good order, and the water well filtered. I examined closely the outfall of the main drain at Barnard Castle, and could not see anything foul coming from it. Immediately below there is a clear bright bed of pebbles, and I could not detect any smell whatever. At Staindrop there was nothing except slops and the surface drainage of the yards. At Gainford there are two small drains, the sewage from which is next to nothing. The beck into which the sewer runs is perfectly bright and clear, and it seems impossible to believe that any sewage whatever goes into it. Speaking sentimentally, I think it better to have sewage kept out of any river; but speaking practically, I think what little sewage there is in the Tees can do no harm. As the public, however, have certain views on the subject, it is the duty of the company to have the sewage kept out. It is necessary to extend the company's works, and, therefore, they must raise further capital, for a personal undertaking has been given by them in order to make the filter-beds.

Cross-examined by Mr. VENABLES: It is a pity the question of sewage has been raised, but the public, having taken it up warmly, the company must try to meet the prejudices of their customers, although I do not believe the sewage in the Tees does any harm. Anything beyond a supply of 14 gallons per head per day is waste. There must be great waste in this district, and this doubtless the company will take steps to remedy. If the corporations reserve a supply of 7½ million gallons a day, to be given by the intended conduit for domestic purposes, it will be sufficient for 500,000 people. I generally find that corporations fight against the out-districts being included in their limits of supply, and in this case Stockton and Middlesbrough will have to make up the loss sustained through supplying the out-townships. The towns will suffer, but it will be an advantage to the villages round about, though these will have to undertake to pay as much as will recoup the corporations for their outlay. The company can have works on the Lune and the Balder if necessary, but they get better water at Tees Cottage, and can supply the district above that place from this source. The Lune and the Balder waters are brown and peaty, while that at Tees Cottage is clear. I do not say that the further they went down the river the better would be the supply, for that depends on what goes into it. The Barnard Castle sewage is very little.

By Mr. BIDDER: I believe there are 350 water-closets at Barnard Castle, and only about 1500 in Stockton and Middlesbrough together. That is a large proportion relatively, but the latter towns have an exceptionally small number. At Norwich, the closets are one to fourteen of the population; at Barnard Castle, one to eleven; and at Stockton and Middlesbrough, one to fifteen. I do not say that is too few, for middens may, if kept properly, be better than closets in a town, as they bring up no sewer gases.

Re-examined by Mr. SOMERSET: There is no necessity for the expensive scheme of the corporations if the company prevent waste, but I do not know what water the iron-works may yet require. Under the Water-Works Clauses Act, the corporations would only supply new districts if they contributed 10 per cent. of the cost, and the company would doubtless be willing to do the same. It will be very costly supplying the villages proposed in the corporations bill.

Mr. *Frederick J. Bramwell*, examined by Mr. SALISBURY.

I am a member of the Council of the Institution of Civil Engineers, and a Fellow of the Royal Society. I have never constructed nor managed water-works, but have paid great attention to the subject, and have advised many large companies. I visited the Tees district both last and this year. The company's proposal for the extension of their works appears to have been agreed to by everybody, as the corporations purpose doing something of the same kind. As far as Normanby is concerned, there will be 100 feet more pressure by the company's scheme than by that of the corporations. It is necessary for the company to raise additional capital for the purposes of their undertaking. The filter-beds will cost £12,000, and there is no money at all to meet that expense. The estimates in the company's bill are ample for what is proposed, and, in the interests of the consumers, their bill should pass, as it will give the cheaper and more wholesome supply. The three towns of Stockton, Darlington, and Middlesbrough all drink Tees water, and we find the death-rate very low in these places. Absolute purity in water is impossible, and it is all a question of degree; but this company's water compares favourably with that of most other towns. The population above the company's intake is decreasing, and the water, therefore, cannot become worse, while it may get better. I think what little sewage there is in the river gets oxidized; still I have no doubt the company will take steps to get that little kept out of the water. If there is any objection to taking more water out of the river, there might be a compensation reservoir made, the effect of which would be to improve the stream. I do not anticipate an increased demand for water for some time to come, in consequence of the difficulty experienced in making Bessemer steel from pig iron affecting the trade of the district; but it will be prudent to make provision for the time when the trade will revive. The company have always given pressure enough, and their filtration is sufficient, while the corporations water, not being filtered, would, at times, create greater prejudice than there ever has been against that of the company. I prefer the water supply being in the hands of a company rather than of a corporation. I object to the compulsory purchase of the works in the present case, with the chances of arbitration. If the company had brought in such a bill as the corporations now promote, it might have been successfully opposed, as the petitions against the bill of 1864 did not complain of the quality of the water then proposed to be supplied. Besides, the corporations would have objected to their streets being broken up for a second line of pipes.

Cross-examined by Mr. VENABLES: I think, when the law declares that corporations shall not enter into competition with water companies, it also means that they shall not annihilate them by taking their property compulsorily. A company can manage more economically than a corporation; but no doubt the inducement to do so ceases to a great extent if they have reached the limit of their dividend, and have a surplus income. In dry weather, the proportion of sewage in the Tees would be much larger than at other times. It would probably then be in the proportion of 1 in 270 parts.

This concluded the case on behalf of the water company.

WEDNESDAY, MAY 3.

Mr. RICHARDS to-day addressed the committee on behalf of the Tees Conservancy Board. He said the constitution of the board was of a popular character. They believed that the corporations bill was better fitted and more serviceable to the Tees than that of the company, and, therefore, they warmly supported the former, and opposed that of the company, which would tend to injure the river. Sir Edmund Beckett had, he thought, somewhat drawn on his imagination in his list of precedents against compulsory purchase, for the peculiar circumstances of each removed it from the list of precedents, and many of those he cited were clear cases of compulsory purchase. The company, in the present instance, had fair warning last year; and yet they came this year with a bill identical with that of last year, proposing to diminish the water-flow at Tees Cottage. The alternative scheme was not gone into last year, but it was repeatedly mentioned, so that the company had fair notice of what the burden of their opponents complaint was. It was asserted that the Lune, the Balder, or the Greta would yield a supply of pure water, and there could be no doubt that Mr. Hawksley, their own engineer, had advised them to go to this source, and probably their counsel advised them to make a bid for a preamble by the suggestions he made. Mr. Hawksley had undertaken that the pipes should not be laid in the bed of the Tees, but that they should be taken over the proposed new bridge.

Sir E. BECKETT: Mr. Hawksley was not instructed to say so, but I will undertake they shall be.

Mr. RICHARDS said as that was arranged, he would pass to his next point, which was as to the injury to the scour of the river which would be caused if the company were permitted to take the proposed additional quantity, and he was instructed that it was not correct, as Mr. Hawksley and other witnesses had said, that the scour of the river did not depend upon the flow of the fresh water from above. The resolution of the company as to a compensation reservoir was nothing but a death-bed repentance, which did not avail a sinner much. They were only staving off the evil day by asking for 30 million gallons a week more from the river, for the depression in the iron trade was not expected to last more than a couple of years at the outside. For the general public good, therefore, he contended it was desirable that the company's works should be handed over to the united corporations at a fair arbitration price.

Mr. *Joseph Dodds*, examined by Mr. RICHARDS.

I am Member of Parliament for Stockton, and am chief clerk of the Tees Conservancy Commissioners, who superseded the Tees Navigation Company in 1852. In 1865 the company proposed to lay pipes under the Tees, and the commissioners gave their sanction, on an agreement to lay the pipes at a certain depth, and to remove them lower in case of the bed of the river being deepened. That was altered in 1867 to a pipe bridge across the Tees; and last year the commissioners told the company they would not oppose the proposal to lay pipes across the bed of the river if the same conditions were agreed to as in 1865. I wrote to the company at the same time, to say the board would oppose the proposal to take 30 million gallons additional from the Tees per week. The company's solicitor's replied that they did not object to the conditions as to the pipes, but declined to give any clauses. They further expressed their surprise that the commissioners should object to the abstraction of more water. If they had offered compensation for the water taken, and given clauses as to the pipes, the commissioners would not have opposed their bill. The commissioners believe they suffer by the present abstraction of water, and would suffer still further by the additional abstraction. The corporations bill proposes to take more water; but they will give water compensation to the river. The flow of fresh water is necessary to carry out to sea the sewage from the harbour.

By Mr. ASPINALL: I am connected with some of the Highway Boards of the district. By the two bills before the committee, some 20 miles of mains and 80 miles of smaller pipes are proposed to be laid. The former more particularly affect the Highway Boards, who held a joint meeting and addressed letters to the promoters of both bills, to know whether clauses would be introduced for the protection of the roads. The corporations agreed to do so, but the company declined, on the ground that the provisions of the Water-Works Clauses Act were sufficient; but the fact is that those provisions are not sufficient. I object to either the company or the corporations always following the lines of roads instead of going over the land. The company do not carry their main-pipes through Darlington, but through Stockton for the supply of the other part of the district.

By Mr. PATERSON: I am the honorary secretary of the Tees Salmon Fishery Board, who, on a former occasion, opposed the company's bill on the ground of the abstraction of water; and in the Lords committee a clause was introduced limiting the amount to 60 million gallons a week. That result, I believe, was owing to the opposition of the board. The abstraction of water has seriously interfered with the fishing in the river between Tees Cottage and the tidal flow. It aggravates the obstruction of Dinsdale Dam, and fish often spawn below. The corporations scheme is much better than that of the company, and will supply a better water without damaging the river. The riparian owners below Tees Cottage are opposed to the company's bill, and are satisfied with the compensation offered by the corporations. I have not heard of any large owner supporting the company's bill.

Cross-examined by Sir E. BECKETT: The fishing has improved in spite of the abstraction of water by the company, for the Fishery Board have not spent their money in vain. The limitation of 60 million gallons was proposed by Lord Redesdale, and adopted by the committee of the Lords. I do not mean to insinuate that the reason of the company's pipes not being taken through Darlington is that some of the directors live there. I have not told any of the ironmasters that, in order to retain the low rate of charges for water, there would be a general rate imposed.

Several witnesses having been called to give evidence as to the effect on the river and the fisheries, of the proposed additional abstraction of water by the company,

Mr. ASPINALL addressed the committee in support of the petition of the Highway Boards against the bill of the company, and evidence was then heard on behalf of the Tees Fishery Board.

(*To be continued.*)

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

TUESDAY, JUNE 13.

(*Sittings in Banco before Justices* BLACKBURN, MELLOR, *and* FIELD.)

SUGG *v.* SILBER.

Mr. WATKIN WILLIAMS, Q.C., Mr. CAVE, Q.C., and Mr. WEBSTER were for the plaintiff; and Mr. ASTON, Q.C., Mr. W. HARRISON, and Mr. MACROBY for the defendant.

Some hours having been spent in reading over the judge's notes of the evidence given on the occasion of the recent trial,

Mr. CAVE said he appeared to show cause against the rule lately obtained by Mr. Aston, which he understood to be confined to the question of whether the invention of Mr. Sugg was properly described in his specification.

Justice BLACKBURN: As to the sufficiency of the specification, and the propriety of the questions left to the jury, with the directions relative thereto. Will it not be more convenient to begin with the first point in the notice of

motion, because if you are defeated upon that, if the patent is bad upon that ground, you are defeated altogether?

Mr. ASTON: I believe the substantial question is whether the specification, as it stands, is a good one.

Mr. CAVE said he wished to make a short statement before coming to the specification. Previous to 1863, the state of invention with regard to the burning of gas in Argand burners was this: For a long period gas had been burned in burners with very small holes, the diameter of which was about 1-100th of an inch; and the inlet into the chamber being of considerably greater area than the total area of the outlet-holes, it followed that gas escaped from the Argand chamber at the point of ignition at a very considerable velocity, from 60 to 90 miles an hour. The notion then prevailing was that that high velocity was requisite to obtain the best production of light from the gas. Another idea was that it added to the illuminating power if the gas were heated before it reached the point of ignition.

Justice BLACKBURN: It can scarcely be put so strongly as that. If people thought anything about it, they thought that heat did good; Mr. Sugg thought it did harm; and Mr. Bramwell seemed to think it did neither good nor harm.

Mr. CAVE said Mr. Bramwell could not state the opinion that was entertained previous to 1863 upon that point. The evidence of the plaintiff certainly was that it was an improvement to have the gas heated. Mr. Sugg soon found out that the burners in which the holes had been enlarged produced a better illuminating power than the others. At that time the burners were almost universally made of metal, and the effect of the action of gas, or of the water produced by the combustion, was to corrode the metal; the holes thus got partially obstructed, and in the process of cleaning them out they became gradually larger, till at length, when they had attained a certain size, the burners were thrown aside as being useless and worn out. Mr. Sugg discovered that those condemned burners produced a greater illuminating power, with the same quantity of gas, than the perfectly new Argand burners did. Thereupon, in conjunction with Dr. Letheby, he made, in 1863, a gas-burner with larger holes than had previously been used—so much larger that the velocity of the issuing gas was reduced to about six miles an hour. Besides this, the top of the chamber was made of steatite, which was not only a non-conducting, but an incorroding material, the rest of the chamber being made of metal. The steatite was not acted upon by the gas, and consequently the holes remained of the same size. That was found to have a very beneficial effect upon the illuminating power of the gas; so that while gas burned by an old Argand burner would produce a light equal to 12 candles, the same quantity of gas in the Sugg-Letheby burner would produce a light equal to 14 candles. The inlet in the Sugg-Letheby burner was not altered; it consisted of two short tubes, the area of which was larger than the combined area of the holes at the top. Mr. Sugg, pursuing his researches, discovered the principle (which everybody admitted was a most important one, and one which had produced a perfect revolution in gas-burning), that, in order to get the greatest illuminating power, the gas should escape from the burner at the least possible velocity. He also discovered that the illuminating power was increased when the gas was brought to the igniting point in as cool a state as possible.

Justice BLACKBURN: He discovered that; but there was strong evidence that he made a blunder in regard to the reason which he assigned.

Mr. CAVE: Mr. Bramwell gave evidence that this was effected not by keeping the gas cool, but by keeping the flame hot.

Justice BLACKBURN: You must take it for the purposes to-day that that was so, because I told the jury that, even if they thought that, it would not prevent the patent being a good one. You must take it, for the present purpose, that Mr. Sugg was mistaken in regard to the reason which he assigned. My idea was that his reason, though a mistaken one, did not prevent the patent from being a good one, any more than in the case of the Marquis of Worcester inventing a steam-engine, and saying in his specification that the steam ran into the condenser because nature abhors a vacuum.

Mr. CAVE: He discovered that it was material that the heat should not be communicated from the burning gas to the unconsumed gas.

Justice BLACKBURN: Not even that. What he discovered was, that if you use a non-conducting material for the chamber which prevents the heat going away from the burning gas, it produces a beneficial result.

Mr. CAVE: So that, instead of 14 candles, the new burner would, with the same gas, produce a light equal to 16 candles. That was the patent invention the infringement of which was complained of. In order to secure that the gas should pass out at the point of ignition, at the least possible velocity, Mr. Sugg contrived three inlet-tubes (for the purpose of carrying the gas from the pipe into the gas-chamber), whose total area was less than the total area of the holes in the top of the chamber. He also used a mode of constricting the gas by means of a conical plug, which could be screwed up so as to fit entirely into a sheath at the bottom of the burner, but which, by means of washers of cardboard, was prevented from fitting closely, so that the area through which the gas had to pass could be enlarged or reduced.

Justice BLACKBURN: The new burner—the "London" Argand—enabled you to have a practical pressure far less than before; but I told the jury that each part of the invention was old.

Mr. CAVE: The claim was for the combination by which, from the same quantity of gas, the light of two additional candles could be obtained. There was no doubt that Mr. Sugg had discovered a valuable principle. The difference between 14 and 16 candles represented, in London alone, a sum of about £250,000 a year.

Justice BLACKBURN: There must be many deductions taken from that. It is enough for you that it is a new invention.

Mr. CAVE said he would now refer to the specification. After stating that the invention was for improvements in gas-burners, &c., the specification went on to say: "These improvements consist in the delivery of the gas into the chamber containing the aperture or apertures at which ignition takes place at a low velocity, and a temperature exceeding that of the surrounding atmosphere as little as possible; and in so arranging the size and shape of the tubes for channels and orifices that the gas shall issue at the point of ignition at an inappreciable, or the least possible, pressure. This is effected mainly by making the bore of the supply-tubes or channels of such size, that in the aggregate the area shall be less than the area of the holes in the chamber or top, which is made by preference of steatite, lava, porcelain, or other incorrodible and non-conducting material, from which the gas escapes, and is burnt. There is also an arrangement for regulating the quantity of gas admitted to the steatite chamber, by making a nose-piece adjustable by means of a screw thereon, and paper or other suitable washers, and forming an inverted cone on the inside of the upper part of the inlet-chamber." Then it went on to speak of the mode of manufacturing the gas-burner by casting: "The improvements in manufacturing the burners consist chiefly in casting and fixing together the principal parts constructed of metal at one operation. For this purpose, iron, steel, brass, or other suitable metal moulds are formed in several pieces, and fitted together with great exactitude, having, in the interior, hollows corresponding in shape and thickness to the various parts of the burner. The supply-tubes are made of brass, steel, or other suitable substance, and are cut in lengths and bent into forms to suit the hollows in the moulds chased to receive them. When they are placed in position, the other parts of the moulds are brought together, and a mixture of tin, lead, and antimony, or other suitable metal or compound, in a melted state, is then poured into the moulds, filling up the interstices, and joining together the supply-tubes before mentioned. Upon separating the moulds, the casting may be removed, and requires but little 'finishing' to fit it for use; a thread must, however, be cut on the interior of the ring to receive the screw of the steatite top, a gastight joint being effected by serving the screw with a little white lead or other cement, and making the interior edge of the top abut upon a shoulder of the ring before alluded to, a paper, card, or other washer intervening." After a reference to the drawings, the specification went on: "Having now described and particularly set forth the nature of this invention, and the mode of manufacturing the improved burner, I would observe, in conclusion, that I do not confine or restrict myself to the precise details described or referred to, as variations may be made without deviating from the general method by which these improvements are produced; but what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited letters patent, is constructing, manufacturing, and means employed in making gas-burners substantially as herein described." It was said on behalf of Mr. Silber that the part relating to the casting was a substantial claim standing by itself, and not as part of the combination, and that as the mode of casting was not new, the patent was invalidated. The first reply to that was, that Mr. Sugg had discovered a principle which he could not patent, and over and above that, he had discovered a practical way of applying that principle, which he was entitled to patent if it was new, and that practical way consisted in making a new combination of several old things.

Justice BLACKBURN: Is that consistent with the language of the specification—"for improvements in gas-burners, and also for the mode of manufacturing"?

Mr. CAVE: At the most, it could only be for the mode of casting in that particular way, and applied to that particular burner. If the same result were produced by the application of the same principle, although it might be done in a somewhat different way, it would be an infringement of the patent. That was clear from the case of *Dewick v. Pratt* (1 Webster's Patent Cases, 146), in which Baron Alderson said: "You cannot take out a patent for a principle; you may take out a patent for a principle coupled with a mode of carrying it into effect. . . . You must start with some mode of carrying your principle into effect; if you have done that, you are entitled to protect yourself from all other modes of carrying the same principle into effect."

Justice MELLOR: I understand you to say that Mr. Sugg has invented a mode of carrying his principle into effect, which is new.

Mr. CAVE: He has.

Justice MELLOR: Is that the mode described in page 4 of the specification?

Mr. CAVE: Yes.

Justice BLACKBURN: Is that so? The mode of carrying his principle into effect is, it seems to me, described in page 3, and what is stated in page 4 is subordinate matter. If he had simply said, "I find that this is the most convenient mode of making my Argand burner," that would have done no harm; but he proceeds to say that his improvement in the manufacture of burners consists in this, and then he describes a thing that is as old as the hills. That is your difficulty.

Mr. CAVE: Mr. Sugg, in his specification, in effect said: "I have discovered a new burner which gives effect to a new principle, and I have discovered a way of manufacturing the burner." Suppose he had stopped short, and not stated what is contained in the fourth page of the specification, he would not have given the public the information they had a right to require; because he would still have retained in his own knowledge something which would have enabled him to make the burner cheaper and better than any one else could make it. If he had said, "In making this, it is necessary to do certain things with considerable nicety, and the mode I adopt is one that is as old as the hills, and that I do not claim as part of my invention," there could have been no objection to that; but is it not straining words to say that the statements in pages 4 and 5 of the specification mean that?

Mr. CAVE: It is impossible to say that this gentleman is here claiming the process of casting metals.

Justice BLACKBURN: It is certainly possible to say it, because for six mortal days I heard it said. Do you not think, instead of saying that it is not possible to say it, you had better turn your attention to arguments to show that it is not properly said?

Mr. CAVE: Mr. Sugg stated that it was a new way, so far as the making of that particular burner was concerned. And in page 3 he stated something which would entitle him to prevent others from making, not only the particular burner there described, but also a burner which, like Mr. Silber's, arrived at the same result by somewhat different means—by the application of the same principle.

Justice FIELD: Your patent is "for improvements in gas-burners, and in the method of constructing and manufacturing the same." If your contention is right, are you not in this difficulty, that you have never specified what your improvement is in manufacturing burners?

Justice BLACKBURN: He says "the improvements in manufacturing consist chiefly in casting and fixing together the particular parts constructed of metal at one operation;" and that is a mode that has been adopted a hundred times before.

Mr. CAVE: As applied to other burners, but not as applied to this. There is nothing which pointed to this particular burner. If he had said, "Improvements in manufacturing burners," there might have been some ground for the contention on the other side; but he expressly limited himself to improvements in manufacturing "*the* burner"—the burners which he had been previously describing.

Justice BLACKBURN: Would it not be dangerous to put it in that way? Suppose a man says, "I have discovered a new carpet, and my mode of dealing with it is to brush it with an old broom," he would then be claiming something to which he had no right. It is an admitted fact that this casting of metal is an old thing that has been known since the days of Tubal Cain.

Mr. CAVE: That would be doing something which anybody could do who had once got a carpet; but, if he had not put this into the specification, he would have retained something which would have invalidated the patent.

Justice BLACKBURN: I doubt it. If he had said, "I do not claim it; I believe it to be an old thing, but I find practically the best way of making it is to do so and so," it would have secured the patent against objections. But can you say that this is what he has done?

Mr. CAVE: He claims a principle, and a particular mode of applying it. It is possible, of course, to suggest difficulties in construing his patent, but you must not look at one isolated portion, you must look at the whole of it; and, if you do so, I contend the result is as I have stated. He is claiming the construction of a gas-burner, and the mode of putting into effect the principles he has described. Then he shows the way in which he manufactures the particular burner, which is the method he selects for putting the principle into operation.

Justice BLACKBURN: Suppose I were to discover, as a principle, a new mode of getting some particularly beneficial food, which should be superior to peas, and were then to take out a patent, not for the improvement in food, but in the manner of eating it, and then proceeded to say, "The improvement in making the pea, and in the manner of eating it, consists in taking a spoon," would not that, under Lord Abinger's instance, be claiming a bad thing?

Justice MELLOR: I cannot help thinking that the whole of the paragraph at the bottom of page 3 describes a machine, or the mode of making a machine, which would have fulfilled all the conditions, but then you do not leave it there.

Justice BLACKBURN: I confess I still retain the opinion which I expressed at the trial, that if the plaintiff had been well advised before he issued his writ,

he would have gone through the patent and stated what he disclaimed. If he had done that, and said, "I disclaim from line 1, page 4, down to line 9, not because it is not good and useful, but because it is not new," he would have improved his specification without doing himself any harm.

Mr. CAVE: I ask you to look at the thing as a whole. There is no doubt that Mr. Sugg has discovered an extremely valuable principle, and applied it in a way that nobody had dreamt of before, and if that is the case, it is in the interests of justice that if the specification can stand it should stand. I do not ask the court to construe it against its plain grammatical meaning; but if there is anything doubtful about it, I ask for such a construction as will preserve rather than destroy the patent.

Justice MELLOR: But then it must be a reasonable construction.

Justice BLACKBURN: I believe the rule laid down by Baron Parke, which upset a good deal of what had gone before, was, that you were not to be astute one way or the other, but fairly to take the meaning of the words; so that if a man has unfortunately claimed too much, he has upset the patent. It had been said in many cases that a patent was an infringement upon the liberty of the subject, that it was an odious thing that should, therefore, be construed as strictly as possible. Many cases had gone the other way, and had it been stated a patent was a reward for a beneficial invention, and that it ought, therefore, to be construed as liberally as possible, so as to reward the inventor. Baron Parke was the first who said we were not to do one thing or the other, but to see what was really claimed, and whether it was really an invention.

Mr. CAVE: Although the mode of casting is as old as the hills, yet, in point of fact, neither this particular burner, nor any other gas-burner, had been cast up to that time.

Justice BLACKBURN: Is not that a good example of the old carpet and the new broom?

Mr. CAVE: Mr. Sugg is making a new gas-burner, and he has to explain the mode of making it, so that all the world may understand how to do it. If the mode of casting gas-burners was something perfectly well known, there would be no reason why he should tell them how to make his gas-burner in that way, because that would be the way ordinarily adopted in making gas-burners. He ought to say, "I make my burners in this fashion; I do not adopt the mode that would ordinarily and naturally be adopted if I did not tell you differently; if you are to have the full benefit of my invention, it is necessary that I should tell you what is the mode that I do adopt, otherwise I shall retain an advantage which I ought not to retain, according to the patent laws."

Justice BLACKBURN: There is one point which is reserved; namely, whether the objection is properly met by the notice.

Mr. ASTON: With submission, I put it in both ways, both as to the subject matter, and as to the novelty.

Justice BLACKBURN: The point reserved was whether the specification was bad, and if the objection was properly made in the notice.

Mr. ASTON: It could not be reserved as a question of novelty in that way. That would be contrary to all precedent.

Justice BLACKBURN: Then we will make a precedent now. What is the notice of objection under which this comes?

Mr. ASTON: That it is not a good subject matter for letters patent.

Justice BLACKBURN: I see nothing in the notice that points out to the plaintiff, "I object to you having claimed an old mode of manufacturing these things." If that had been done, the plaintiff, if he had been well advised, would utterly have discontinued his action, disclaimed that part of the patent, and waited until you began to sell your Silbers again, and then proceeded.

Mr. ASTON: We are not bound to give any particulars of objection, except in regard to the instance of prior user, or prior publication relied upon.

Justice BLACKBURN: I want to know what it is that you do rely upon?

Mr. ASTON: The plea itself.

Justice BLACKBURN: That is not a notice of objection.

Mr. ASTON: The plea states that the plaintiff did not invent the supposed invention mentioned in the declaration, nor was the supposed invention any new manufacture. That is the objection.

Mr. CAVE: The notice of objection to the letters patent was to their being bad altogether, not to some little portion being bad, which might have been removed in the way your lordship has suggested. The plaintiff ought to have had a full notice of the objection, so that he might cure it if it were capable of being cured, meet it if it were capable of being met, or stay the action if it was something he could get over.

Justice BLACBURN: When you have a notice of objection, certainly of the greatest wideness, amounting almost to a fraud upon the statute, is not the proper remedy to go to a judge, and ask him for a better and more pointed mode of objection?

Mr. CAVE: But surely first they must comply with the statute? If they had something which is not even in compliance with the statute, but which is an intention to evade it and put us off the scent, we are not obliged to go into particulars. There is the case of *Fisher v. Dewick* (4 Bingham's New Cases, 706) bearing on this point, in which it was held that it was not enough simply to object that the improvements, or some of them, had been used before, but that it was necessary to point out which.

Justice BLACKBURN: I think there are a great many cases bearing upon this point, which, I suppose, will be brought before us.

Justice MELLOR: If it is meant that the objection is not sufficiently definite in regard to time, I suppose that could be corrected by a judge.

Mr. CAVE: Perhaps we might have been able to amend, if the matter had been properly brought before us. The next point is as to the questions that were left to the jury by your lordship.

Justice BLACKBURN: The point we wished to be discussed is this, whether the questions which, in fact, I asked the jury were proper questions to ask the jury, and whether my comments and directions were proper guides to them in answering those questions.

Mr. CAVE proceeded to read extracts from his lordship's summing up, and to contend that the questions left to the jury were proper ones. With reference to the words "by preference," he said it was curious that they did not appear in the provisional specification at all.

Justice BLACKBURN: It is pretty obvious that the patent agent who drew up the specification thought he would make it a little wider, and, therefore, put in the words "by preference," thus raising the question whether he has not vitiated the patent.

Mr. CAVE: Mr. Bramwell says that a skilled man would be able to put the matter right; the question left to the jury was, whether the description was sufficient for a man of competent skill.

Justice BLACKBURN: The question is, whether it was proper to ask that question. When a man has used these words, "by preference," was it a proper question to ask the jury, whether a man of competent skill would correct that blunder, and say, on reading it, it was not "by preference," but that it must be?

Mr. CAVE: The question is whether a man of competent skill would be able to make the thing from the specification.

Justice MELLOR: Would a man of competent skill be able to say that it was essential, and not merely preferential?

Mr. CAVE: That is a question of fact to be asked the jury.

Justice FIELD: Does not that depend upon the construction you give to the specification? If in writing he has described something else, you cannot leave that to the jury, can you?

Justice BLACKBURN: I had been reading this case of *Nelson v. Hertford*, and my impression was that the grounds on which the Exchequer Chamber supported the patent, justified my leaving this question to the jury; but whether or not I was justified, is a matter of considerable nicety.

Mr. CAVE: The patent says clearly that you must not make this of a non-conducting material.

Justice FIELD: Mr. Aston's contention is that you may use a corrodible and a conducting material, and yet construct the same burner.

Mr. CAVE: I apprehend it is not a matter for the construction of the courts of law as to this patent, but a question for the jury, as to whether a person of competent skill would be able to make the thing from the description.

Justice BLACKBURN: Not merely that, but would he see that the words, "by preference," had crept in by mistake, and were to be rejected? That is in substance what I left to the jury. It will be said on the other side that I was bound, as a matter of law, to state that the specification was bad.

Mr. CAVE: Surely that cannot be so. It is not a matter of a court of law, it is a question of fact.

Justice MELLOR: It says, that being made of steatite, it will succeed; but then it tells you by implication that it may be made of any other material and still succeed.

Mr. CAVE: The jury found that a man of competent skill, on reading the specification, would say that he must make it only of steatite, or some non-conducting material. Mr. Sugg begins by saying that his improvement consists in the delivery of the gas at a temperature exceeding that of the surrounding atmosphere as little as possible. Every person of ordinary skill would know that if you have that gas in a chamber of conducting material, you will not have it at as low a temperature as possible, and that if you have it in a chamber of non-conducting material, you will have it as low as possible. No man of ordinary skill wants to be told that if you deliver a fluid, especially an aëriform fluid, into a hot chamber, you will make it hot, and when he is told that the object is to keep it cool, he will know that he must not deliver it into a hot chamber. Before 1862 it was not known that it was advisable to have the gas cool, but the moment that Mr. Sugg said it was necessary that it should be cool, every one would say that it must not be put into a hot chamber, but into a cold one.

Justice FIELD: What meaning do you give to the words, "by preference"?

Justice BLACKBURN: What is the preference contrasted with? Does it mean matters that are corrodible?

Mr. CAVE: Steatite, lava, and porcelain, are contrasted, "by preference," with other incorrodible and non-conducting materials.

Justice BLACKBURN: It would be so if it was said that "instead of other incorrodible and non-conducting materials." Surely the preference is to metal and other corrodible materials.

Mr. CAVE: There is nothing to show that, and if you turn to the provisional specification, you will find that steatite or porcelain is specified. If there was nothing in the first part about requiring the temperature to be cool, that construction may be put upon it, but you must take the thing as a whole, and then it is obvious what is meant.

Justice MELLOR: The words are, "temperature to exceed the surrounding atmosphere as little as possible." That is hardly equivalent to saying as cool as possible.

Justice BLACKBURN: The evidence certainly did lead me to the conclusion that if a cool chamber was a non-conducting one there would be no benefit at all.

Mr. CAVE: It did point certainly to that, but the evidence of one of the witnesses went to this effect, that he substituted a metal chamber for a steatite chamber, and then the gas produced the same effect as the Sugg-Letheby burner.

Justice BLACKBURN: And consequently there was no improvement at all.

Mr. CAVE: Not quite so; because the Sugg-Letheby burner has a chamber at the top, which is made of steatite. What a competent workman would understand by the specification is a question of fact; the court has no power to put itself into the position of a competent workman.

Justice BLACKBURN: We may say that though a competent workman would understand it, the person who drew the specification has forgotten to give that effect to it which a competent workman who is not so restrained would do.

Mr. CAVE: My point is that it is only for a court of law to interfere when it sees clearly that a competent workman would not understand it. The court is not a competent workman, and has not the mind of a competent workman. The specification might be expressed in terms of art which the court would not understand, and if the jury found that these terms of art bore a meaning which a competent workman would understand, clearly it would not be for the court to say that it understood them in a different sense. The only office of a court of law is to see that the jury do not find contrary to the evidence that a competent workman would understand that which he would not understand. The next point is as to the delivery of the gas into the chamber. The words of the specification are: "In so arranging the sizes and shapes of the tubes or channels and orifices that the gas shall issue at the point of ignition at the lowest possible pressure." Everybody agreed that that would be understood by a competent workman. The witnesses on the other side said it was a mistake; but the thing to be arrived at is, that the gas should issue at the point of ignition with the lowest possible velocity; that is what any one would understand. The intention is that it shall go through the bent tubes at a low velocity; it does not say that it shall enter the chamber at the lowest possible velocity; it is to enter at a low velocity, and leave it at the lowest possible velocity, and that is actually what is effected. The constriction by the regulator reduces the velocity.

Justice MELLOR: It is essential that in a specification you must have a process of reasoning of that kind going on in your mind, in order to ascertain whether it is or is not a part that you must choose to guide you.

Mr. CAVE: Suppose a man follows the direction given him, and succeeds in making the machine, is it material that the inventor has not accurately appreciated the whole effect of the words?

Justice BLACKBURN: The point here is, can we ask the jury whether a competent workman would not say that there has been some mistaken expression; that a man has said black when he meant white?

Mr. CAVE: I submit that that is a fair question to put to the jury.

Justice BLACKBURN: I hope it was a fair question; but you should give reasons for thinking so.

Mr. CAVE: I submit that the question is not whether there is a slip here or there, the main object required being that a competent workman shall see how to do it. The jury have found that this does describe the nature of the invention, and in what manner it is to be performed, and I do not see, therefore, how a court can say that it does not describe the way in which it was to be performed.

(*To be continued.*)

BATH COUNTY COURT.—THURSDAY, JUNE 15.

(*Before Mr.* CAILLARD, *Judge.*)

SMITH *v.* ANDERSON.

The plaintiff sued the defendant, manager of the Bath Gas-Works, for 6s. 6d. for wages.

Mr. PETGRAVE appeared on behalf of the company.

The *plaintiff* said that he was told by the defendant that the rules had been altered, and he would have to lose two days back money. He would not then go on to work, and left.

His HONOUR said that there was no case to answer.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

COURT OF COMMON COUNCIL.—At the meeting of the court, on Thursday last, the report of the Gas Committee, which we published on the 16th ultimo (page 732), referring to the progress of gas legislation during the present session, was taken into consideration. In the course of the discussion Mr. Bontems asked if the Court could have any information with regard to the cost of the proceedings of the committee on this question during the last two or three years? Mr. Edmeston said he could only speak with regard to the period during which he had occupied the chair of the committee, and the matter in the course of the present year had been almost entirely the subject of arrangement and negotiation. Mr. G. Shaw, the previous chairman of the committee, said he thought the Court would be astonished at the very low sum these expenses would amount to, and particularly so when considered in connexion with the great advantages secured to the consumers. The report of the committee was approved.

METROPOLITAN BOARD OF WORKS.—At the meeting of the Board, on Friday last, the Parliamentary Committee presented a report, recommending that a petition be presented to the House of Lords against The Gaslight and Coke Company's Bill, and that the Board do oppose before the Select Committee of that House the granting of power to the company to acquire any part of the Board's land at Barking. The report was adopted.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone, and supplied by The Gaslight and Coke Company, during May, 1876 :—

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon.in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 25 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Gas supplied from the Fulham works . .	16·35	17·31	15·74	22·92	8·85	15·83	0·56	No trace
Gas supplied from the Beckton and Bow works	16·46	17·14	15·71	30·50	13·57	11·62	0·56	No trace
Cannel gas supplied from the Pimlico works	20·50	21·31	19·74	19·63	10·51	14·40	0·36	No trace

Mean of daily readings of barometer . . . 29·85
" " " thermometer . . . 61·74

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the gas supplied to the parish during the month by The Gaslight and Coke Company, from the Fulham works, was equal to the light of 16½ candles; it ranged between 15·74 and 17·31 candles; on four occasions it exceeded 17 candles. The mean amount of sulphur found in 100 cubic feet of this gas was nearly 16 grains, and of ammonia half a grain. The mean light of the gas supplied from the Beckton and Bow works was nearly 16½ candles; it ranged between 15·71 and 17·14 candles; twice only was it below 16 candles. The mean amount of sulphur found was less than 12 grains, and of ammonia half a grain. The cannel gas gave a mean light equal to 20½ candles; it ranged between 19·74 and 21·31 candles. The mean quantity of sulphur found was 14½ grains, and of ammonia a third of a grain. The pressure of all the gases was fair, and no trace of sulphuretted hydrogen was detected in either of them by the ordinary tests.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of Thames companies and other waters supplied to Marylebone during May, 1876 :—

	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling, in degrees.	Hardness after boiling 15 minutes, in degrees.
	May, 1875.	May, 1876.	May, 1875.	May, 1876.		
	0°	0°	0°	0°	0°	0°
Distilled Water . . .						
West Middlesex . . .	19·12	19·20	0·80	0·88	13·00	2·90
Grand Junction . . .	19·44	19·92	0·96	0·92	13·40	3·00

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water.

	Chlorine, in Grains, per Gallon.	Parts per Million. Free Ammonia.	Albuminoid Ammonia.
West Middlesex	1·10	0·008	0·072
Grand Junction	1·10	0·01	0·09

The water taken from the mains of the two companies, as seen through a glass tube, 2 feet in length, was clean, bright, and almost colourless. No living or dead organisms were detected in it by the microscope.

BRITISH ASSOCIATION OF GAS MANAGERS.

The Thirteenth Annual General Meeting of the Members of this Association was held during the past week in the rooms of the Society of Arts, Adelphi, London—ROBERT MORTON, Esq., Mem. Inst. C.E. (the President), occupying the chair. The attendance of members was large at the opening of the proceedings, and was well sustained throughout the whole of the sittings.

TUESDAY, JUNE 13.

The PRESIDENT took the chair at eleven o'clock in the forenoon.

The minutes of the last general meeting, and the financial statement for the past year, which had been previously printed and circulated amongst the members, were taken as read, and, upon a show of hands, were approved.

NEW MEMBERS.

The SECRETARY (Mr. W. H. Bennett) presented the list of applications for membership, as follows :—

ORDINARY MEMBERS.

Ashley, W.	Tenbury.
Ashton, I. C.	Old Swindon.
Ball, T. B.	New Wortley.
Barnett, E.	Fermoy.
Beal, W. E.	Maidenhead.
Bengough, jun., J. E.	Vienna.
Bennett, W. C.	Tiverton.
Brémond, L.	Versailles.
Bruce, T.	Shotley Bridge.
Carr, W.	Halifax.
Cleminshaw, T. S.	Christchurch, New Zealand.
Colson, A.	Birmingham.
Copp, W. L.	Watchet.
Dalgliesh, J.	Ashton-under-Lyne.
Davies, J.	Nantwich.
Donaldson, A.	Queenstown.
Dunn, J.	Kilrush.
Duxbury, T.	Accrington.
Gandon, C.	London.
Green, Jno.	Heckmondwike.
Harris, J.	Plympton St. Mary.
Hobson, J.	Chapel Town.
Holmes, jun., W. C.	Shanghai.
Jacobs, C.	Blackwater.
Jervis, J. J.	Swindon (New Town.)
Jolliffe, J. T.	Hendon.
Kershaw, R.	Calcutta.
Keys, R. P.	London.
Layton, T.	Redditch.
Lewis, B.	Carmarthen.
M'Crae, J.	Bury St. Edmund's.
M'Gilchrist, J.	Dumbarton.
Martin, H. R. H.	Llanelly.
Morton, J.	Ashford.
Parsons, J. H.	Oswestry.
Peeks, H.	Thorne.
Penney, J. H.	South Shields.
Ridley, G.	Newcastle-on-Tyne.
Rogers, G.	Hexham.
Sainsbury, H.	Trowbridge.
Singleton, H.	Dronfield.
Smith, J.	Sunbury.
Smith, R.	Darlington.
Smith, W.	Helensburgh.
Sowood, S.	Belper.
Stansfield, W.	Exeter.
Stephen, W. H.	Sydney, New South Wales.
Surl, J.	Tralee.
Tobey, H.	New Malton.
Townsend, H.	Waltham.
Watson, J. K.	Edinburgh.
Watson, S.	Tunstall.
Wimhurst, H.	Andover.
Woodruff, W. W.	Sandwich.

The above names having been submitted to the vote, it was resolved—"That the gentlemen whose names have now been read be elected ordinary members of the Association."

The SECRETARY read the names of the following gentlemen, who had applied to be admitted as extra-ordinary members of the Association :—

EXTRA-ORDINARY MEMBERS.

Gibbons, B.	Stourbridge.
Orme, D.	Oldham.
Potter, C. J.	Newcastle-on-Tyne.
Wyld, Jno.	Bradford, Manchester.

These gentlemen were unanimously elected extra-ordinary members of the Association.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen, Members of the British Association of Gas Managers,—My first duty is to thank you for the honour you have put upon me by electing me your President. I was prevented attending your meeting at Leeds last year, so that this is the first opportunity I have had of tendering my acknowledgments, and, in doing so now, I have to assure you that I value very highly the expression of your good opinion, which has placed me in this honourable position, and not less highly do I esteem the office itself. I am, however, far from being sure that you have used your suffrage wisely.

I take this chair with pleasure, because you have called me to it, yet not without considerable hesitation. When first my name was mentioned for nomination, I raised strong objections on various grounds, chiefly on my felt inability for the duties of the situation. These objections were overcome by the influence of friends, who thought they knew me better than I did myself, and to them must attach any blame if you find that you have been misled.

I can promise, however, that no effort shall be lacking on my part to justify their recommendation, and to discharge the duties you require of me to the best of my ability. In the discharge of these duties, I rely with confidence on a continuance of the same spirit of brotherly kindness, moderation in discussion, and regard for order, which have hitherto characterized our annual gatherings, and I trust to find these duties as pleasant as they are honourable.

The first is the delivery of an Inaugural Address; and permit me here to say that—with three, four, and sometimes as many as six, carefully-prepared papers left unread, and others read but not fully discussed, for want of time—I think you will agree with me that this address ought scarcely to occupy so much time as hitherto.

In a society, holding its meetings weekly, or even monthly, the president may fairly be allowed as much time as he chooses for the opening speech of a long session; but meeting, as we do, only once a year, for a session of two days, I think he ought to be contented with, say, half an hour, and thus leave more time for expressions of opinion by a larger number of members, on the subjects brought under their notice in the different papers. This is what I purpose doing.

DEATHS DURING THE PAST YEAR, AND CHANGES.

Gentlemen, each annual convocation which brings us together from our various posts, scattered over the length and breadth of the kingdom, while it revives a fellowship of which we all feel that we have too little, bids us also note those silent changes—those exits and entrances which steadily renew the membership of every earthly society, replacing old with new.

Since this time last year, we have lost seven ordinary members by death—namely, Mr. T. A. Drew, of Widnes; Mr. W. B. Emmerson, of Blackburn; Mr. L. Hislop, of Ayr; Mr. C. W. Kitto, of Tunbridge; Mr. J. W. Lawson, of South Shields; Mr. C. Tadman, of Norwich; and Mr. J. H. Robinson, of Leamington, one of our original members, and, I may also say, one of the pioneers of gas lighting. We have also lost one of our few honorary members—namely, Dr. Henry Letheby—whose decease, at the comparatively early age of sixty, has left a blank in the gas world, as well as amongst sanitary authorities and analytical chemists, which will not easily be filled. We all remember with delight his interesting and instructive lectures, delivered before our own Association, marked alike with easy flow of speech and rare manipulative skill, and many of us can bear testimony to the readiness with which he gave us the benefit of his knowledge and experience. I would here just note, that of the nine gentlemen who have preceded me in the post of president, only five remain to-day. We regret the absence of one of these—Mr. Goddard, of Ipswich—and also of one of our vice-presidents—Mr. Douglas, of Portsmouth—through personal illness.

In conformity with rule 37, passed last year, you will be asked to expunge from the list a number of members who have not contributed to the funds for some years past. Most of these are persons whose residences are not known to the secretary.

As kindred to this, I may mention that the fact of several gentlemen having ceased to possess the qualifications which obtained their election as ordinary members has been brought before your committee, with a request that such cases should be dealt with. Your committee, while ever ready to consider any question, suggestion, or recommendation, brought before them by any of the members, felt that this was a matter which required to be handled very delicately, and decided to take no action in the meantime.

I have to congratulate you on the continued prosperity of your Association. One of the original 92 members, enrolled on the 11th of May, 1864, I have watched its growth with much interest. Your membership has steadily increased, till, with the addition of 54 names at this your thirteenth annual meeting, it stands at 641.

In its early years, some difficulty was experienced in meeting the expenses, and, at that time, the Association was much indebted to its then treasurer, the late Mr. Adamson, of Leeds. Now, as will be seen by looking at the accounts, there is an available balance of about £470.

Some one has said that we are not a financial society, and that, if we meet our current expenses we do all that is necessary. Many think that we should do something more than this—a suggestion has been made that we should erect a hall for our meetings, and have in connexion with it the necessary offices, and a laboratory, with a duly qualified chemist, I suppose as adviser-general to all the members.

Establishment of a Benevolent-Fund.

The establishment of a Benevolent-Fund too, has, on more than one occasion, been before you for consideration, and has lately had some attention given to it in the JOURNAL OF GAS LIGHTING, where the report of the committee of 1873 on this subject has—not I think, without good reason—been spoken of as—well, not exactly what it ought to have been. This may, perhaps, be capable of explanation by that committee; but looking at the resolution passed at the meeting held in 1872—namely, "That in the opinion of this meeting it is desirable to form a Benevolent-Fund," &c., &c.; and at the strong desire expressed by many, that this resolution should be carried into effect, I make no apology for reintroducing the subject now.

I shall take care that at the proper time it is brought forward for discussion, and I trust that such action may be taken, as will result in the establishment of such a fund on a broad and firm basis. I am not only encouraged, I am constrained to do this by spontaneous offers of assistance from outsiders. These offers, indicating as they do the growing estimation in which we are held, and a desire that we should not be behind our neighbours in this respect, I think it would be very ungracious to refuse.

Preparation of Papers for Discussion.

The continued success of our Association depends very much on the number, but especially on the character of the papers which are read at our annual meetings. It is therefore matter of regret that the committee has, year by year, to complain that it is only by personal application, and by bringing some pressure to bear, that a sufficient number is secured. This, in great measure, accounts for the fact of our being favoured with papers by—in two or three instances—the same gentlemen almost every year.

This is not as it should be, and it assuredly does not arise from a desire on the part of those gentlemen to be always before you. This is a subject of such vital importance that you will pardon me for pressing its consideration on every member. Some plead want of time. To such I say, all members contributing, a sufficient number of papers will be forthcoming if each contribute one once in 50 years, and that surely cannot be called taxing time too heavily. Others say, "We cannot produce papers equal to those already read." To these I say, "Give us what you can, but endeavour to excel." There are still others who excuse themselves on the score of inability to express their views on paper, and to these I would say, "Endeavour to form clear and decided views for yourselves on every matter connected with your profession, carefully studying and digesting all the written and oral information you can get on the subject, and you will in time learn to give expression to your views." I believe many do not write, and many do not speak on the papers of those who do write, because they have not taken much trouble to *think*. The younger members will bear with me when I say a very few words on the education of gas managers. Our friend and past president, Mr. Livesey, when addressing you in 1874, made some very pertinent remarks on the "Qualifications of a Gas Manager."

Qualifications of Gas Managers.

These I need not recapitulate, but I am sure we all agree with him as to the great advantage the possession of these qualifications gives, both to a manager and to the company he serves. It does, however, occur, though perhaps to a less extent now than it did in the earlier history of gas lighting, when everything connected with it was in the experimental stage, yet I say it does happen that some gentlemen find themselves managers of gas-works before they have acquired even a moderate proportion of these qualifications, and find themselves not unfrequently perplexed in consequence.

Doubtless the education of greatest value is that of experience; but experience is a very dear school, though it is said that certain people learn at no other. Necessity is the mother of invention, and, under stress of necessity, many and mighty difficulties have been overcome; but I hold that time and energy, not to speak of money, are wasted in discovering for oneself what has already been discovered and recorded by others. To those circumstanced as described, I would say, that while carefully noting for future use everything which takes place under your own eye, in your own works, you must, if you have any desire to rise above mediocrity in your profession, strive to acquire a knowledge of what has already been done in all the branches of it, and, by study, in leisure hours, of correlative sciences—in which you can be so greatly helped by those science classes which, happily, are now to be found in almost every town and village—and further, by a careful perusal of the Transactions of our own and like Institutions, fit yourselves, not only for carrying on your own works creditably and profitably, but for the further investigation of those innumerable questions which are continually presenting themselves, and, let me add, for taking an active part in the business of our own Association. I said I need not recapitulate the qualifications enumerated by Mr. Livesey, but I cannot let this opportunity pass without urging upon those of you who may have sons looking forward to entering the profession, the desirability—in addition to giving them the best and most suitable school education in your power—of teaching them some mechanical handicraft, engineering by preference; but, be it that of a blacksmith, carpenter, tinman, gas-fitter, bricklayer, or stonemason, I am satisfied that, everything else being equal, the lad who has learnt one of these trades, to speak plain English, has a better chance, if I may use that expression, and will prove a more useful man, than one who has not; and, moreover, having become accustomed to the discipline of the workshop, ought to be a better manager of men as well as of works. You all know the growing difficulty there exists in dealing with men, and that, though there are some exceptions, yet, as a rule, the amount of work they do, seems to bear an inverse proportion to the amount of—I was going to say money they earn; it will be more correct to say wages they are paid; so that it is well for a young man to have a personal acquaintance with work itself before he has to deal with workmen.

Papers to be Read.

Speaking of the management of men leads me to notice a paper by Mr. Travers, of Cork, which will be read to you, on "Piece-work or Day-work, as applied to the Reduction of the Labouring Force in Gas-Works." If country friends happen to have experienced the same difficulty with their men during the past winter as many of us did here in London, I am sure this paper will be listened to with interest, and with a hope that some practical solution of what is really a grave difficulty may arise out of it. As my words will doubtless reach a large number of these same men, I would say that I fully recognize their right to sell their labour at the highest value they can get for it, and I would not grudge them the high pay they are now getting, if they would simply give a fair return for it; and a fair return is, I consider, something more than a certain *amount* of work done any how; it includes a regular attendance at it; a willing and hearty way of doing it; an attention to rule; a consideration for their employers interests; and a care for their property, which, I am sorry to think, is commonly very conspicuous by its utter absence, and I would ask the men why is this so? They may dispute the fact, but fact it remains nevertheless, as many of you, gentlemen, only too well know; but, whatever they may say, I believe it arises indirectly from the high wages. They have more money to spend, and they misspend it largely in drink, which when it does not unfit them altogether for their work, engenders a careless, happy-go-lucky disposition, which prevents them considering anything beyond the hour.

Intimately bearing on this question is that of "Sunday Labour," which will be spoken to by Mr. Woodall, of London. I was the first to bring this subject before the Association, and I may be pardoned for adverting briefly to it now. I would first say that I read with great regret the remarks made last year by my friend, Mr. Paterson, from this chair, tending, as they did, to hinder, what he himself admits, is a step in the right direction. I cannot at all agree with him that "the question practically resolves itself into a matter of expediency." If it can be shown that it is right and proper to do a certain thing, then I think nothing short of insurmountable difficulty should be allowed to prevent its being done; and I think in the discussions on this subject, and in the report of the committee of 1871 upon it, it was shown, not only that it was our duty to stop our works on the Sunday, but that there was really no great difficulty in the way of its being done.

Many previous to that time (and I was one of the number) were carrying on operations on Sundays as on other days, simply because it had always been done, and they had not thought of the possibility of doing otherwise. I would here like to disclaim a credit which has attached to me for being the first to incite a careful consideration of such a possibility; for though I was the first to bring it before you, and one of the first to give the thing a fair trial, it had already been forcibly and clearly pointed out to me and a few more metropolitan managers, by Mr. Gritton, the secretary to the Lord's Day Observance Society. And I find, as far back as 1857, at the general meeting of the South Metropolitan Company, a Mr. Edgington introducing the subject, and urging its consideration upon the directors, with, unfortunately, no effect. It has been advocated by many of yourselves, and all the objections and difficulties discussed, refuted, and overcome. The number of works in which at least a 12 hours stoppage is practised, increases year by year. Since we last met, the Corporation of Glasgow instructed their Gas Committee to go into the matter, and ascertain the cost it would entail. They did so, and, without giving particulars, which Mr. Woodall may probably do, I may state that the system now prevails throughout all the works there.

I may say that more than one engineer has succeeded in stopping his works for all the twenty-four hours of the Sabbath, and I close these remarks by quoting words used by Mr. Samuel Hunter, in 1873, when speaking on the subject:—"It can be done; and, having settled the possibility, whether it be more expensive or cheaper, it ought to be done. Physically, intellectually, and morally, the men require it, and the laws of God demand it."

Still bearing on the subject—labour—we are promised a paper by Mr. Spice on "West's System of Charging and Drawing Retorts." This was introduced to your notite by Mr. West himself in 1874, and its merits very freely discussed, some members seeing "no possibility of the apparatus connected with it ever coming into actual operation," while others thought it "the most efficient stoker they had yet seen." Since then some modification has been made in the apparatus as well as in the method of its application; the drawing and charging, then done in one operation, are now done separately. However, I need not enter into details, these will be better supplied by Mr. Spice; suffice it to say that, having seen the apparatus at work, I was very much pleased with it, and having gone somewhat carefully into the results obtained by its use, I have no hesitation in saying that the system is a decided improvement on the one prevailing at present, and of recommending its adoption in small and medium-sized works. Engineers of such works would do well, in making any alterations in their settings, to put in retorts which would suit it. Mr. West's improved apparatus has now been at work at Maidstone for about twelve months, and I understand it is being adopted by Mr. Eldridge in the works of the Richmond Company.

For large works, and especially for those having stage-houses, I am not so sure as to the suitability of this system. In these works the ordinary method of intermittent and comparatively heavy charging continues to be practised, and we must look for assistance, in diminishing manual labour, to an ordinary scoop and rake machine. Of these, several have been tried and abandoned. Last year, Mr. Warren, of Crewe, described to you a machine patented by him in conjunction with Mr. Wates, of Greenwich, and hoped to be able to tell you of its success at this meeting. Circumstances, it seems, have arisen, which have prevented the realization of this hope, but the machine is now, I understand, being erected at the works of the Phœnix Company, at Greenwich.

So far as I know, the only machine of this class really in use, and doing good service, is the "Hydraulic Stoker" of Mr. Foulis, of Glasgow. Four pairs of these machines have been at work at one of the stations of the Manchester Corporation for some eighteen months, and the results of last winter's working have been such, I understand, as to induce the corporation to order others. They are being introduced at the Rochdale Gas-Works, and by the Chartered Company at Beckton, where I expect we shall see, at least, the drawing machine when we visit that mammoth establishment on Thursday. Several well-grounded objections were raised against these machines at their first introduction, but with the exception of the necessity of an accumulator for maintaining the hydraulic pressure, these related altogether to their detail arrangements. It has been found now, however, that a moderate-sized steam-pump, with a suitable air-vessel, answers all the purposes of the accumulator, and such improvements have been effected in the different parts, as meet most, if not all, of the objections just referred to—notably, the flexible tube, expensive in itself, very costly in wear and tear, and clumsy and awkward to handle, has been superseded by an arrangement of iron pipes, with ingenious and simple swivel joints (a sample joint is on the table). By means of these pipes, a traverse of 100 feet is obtained for the machines without the necessity of disconnecting them. The elastic stuffing of the gland of the rake-bar, which was a constant source of annoyance, is also done away with, and a novel arrangement of conical metal rings substituted, which promises to work well, and effect a further saving in wear and tear, as well as of time in repacking. Thus improved, I expect this machine will be able to hold its own against any of the same class we are likely to see for some time to come.

Turning from labour and labour-saving machines to the gas-making apparatus proper, Mr. Richards, of London, is to treat of "Heating Retorts." I shall not anticipate him further than to say, that, as so much money is either saved or lost, according as this is skilfully or carelessly done, the subject commends

itself to your patient consideration. I will, however, say just a word on the retort itself. We are much indebted to some of our fire-goods manufacturers for the care and attention they have given to the production of what would best meet our requirements, and I am sorry to think they have not been seconded, as they deserve, by some of ourselves. Many engineers buy the cheapest retorts they can lay hold of, without duly considering quality, or taking thought that they may prove the dearest in the long run, and makers who would rather make a first-class article, are thus forced to make an inferior, to enable them to compete. Doubtless, this is what has led to the introduction of machines in their manufacture. There exists, I believe, a considerable prejudice against these machine-made retorts. I have set some 4000 feet or more of them. Some have been in use for 15 months, and have given good satisfaction. I do not say that in quality they are better than those well and carefully made by hand; but I certainly do not think them inferior. In shape and finish they are much superior, and I think with them we have a better guarantee of uniformity of quality. Moreover, they expand little in heating. The paper next in order on apparatus is that by Mr. W. L. Copp, of Watchet, which asks this question: "Is the Removal of the Dip desirable?" Now, although the answer to this question has been far from unanimous, I think we are all agreed that the removal of the pressure on the retort caused by the "dip" is desirable. Perhaps I should say "were all agreed," for some of you have heard, and doubtless most of you have read, the very interesting address of Mr. Dunlop to the West of Scotland Association of Gas Managers in April last, and it is just within the bounds of probability that some of you may be converts to his views. For the benefit of those who are not conversant with his idea, I make this short extract:—"In my opinion the experiments I have already referred to go to show pretty clearly that there is no substantial gain in employing an exhauster to overcome the working pressure and prevent leakage through the porous clay retorts." At a meeting of the same Association in September, 1875, the same gentleman says, "Were it possible to relieve the pressure of the atmosphere altogether, so that there would be a perfect vacuum in the retorts, this deposit of carbonaceous matter would, in my opinion, cease, and thus our work be facilitated, and our revenues increased." I refrain from making any comments, and would only say, that it seems to me—whatever we may be doing here in the South—they take rapid strides in the North, whether progressive or retrograde I leave you to judge. Returning to the question of removing the dip, I need not enumerate all the schemes which have been recommended for effecting it. In works not having an exhauster, one or other of them should certainly be adopted.

Following the order in which we generally find apparatus placed in gas-works, we come to Mr. F. W. Fison's paper on "A New Exhauster." This would have been more correctly headed "A Plan for Regulating the Speed of Mechanical or Engine-driven Exhausters." Regularity of vacuum is a most important matter, and the means for securing this, proposed by Mr. Fison, are simple. Whether novel or not you will presently be able to judge.

The last paper on apparatus employed in the manufacture is one by Mr. C. Hunt, of Birmingham, on "Washers and Scrubbers."

Mr. G. Livesey is to give you his "Further Experience with 'Concrete Tanks.'" This we wait for with considerable interest. Mr. Livesey will also bring before you, in a more formal way than he was able to do from this chair in 1874, when he touched on it, and spoke, not very kindly, of those who had raised it, the question, "Is the Reduction of the Sulphur Compounds worth the Trouble it Entails?" I trust this will be fully and fairly discussed, and that, whatever else may arise out of the discussion, it may be shown how groundless is the charge brought against us, by those who constitute themselves our censors, that we require the spur of "self-interest" to drive us to the study or consideration of any matter that will tend either to economy in the manufacture of the article we sell, or to the comfort of those who use it.

If further proof of the groundlessness of this charge be required, I think the pages of the JOURNAL OF GAS LIGHTING furnish it in the increasing amount of correspondence and discussion on such matters which they bear year by year, and the search after extended and more accurate knowledge which the said correspondence discovers.

The "Valuation of Ammoniacal Liquor" will be introduced to you by Mr. W. D. Child, of London, and if he can show a simple and easily applied method, not open to the objections attaching to those now in use, and at once satisfactory to you and to your liquor contractors, he will deserve the best thanks of the Association.

Mr. W. J. Warner, of South Shields, proposes to read a paper on "Mains and Services," and this is the only one which is in any way connected with "distribution," unless, indeed—and this brings me to the only remaining paper—we consider "The Best Means of Extending the Use of Gas," by Mr. J. Watson, as coming under that head. Under whatever head we may place this, it certainly touches on a subject well worthy of our consideration. I dare say there are many of you who will say we have never had to consider it, for the demand upon us has been so great that we have been able to do little more than keep pace with it.

It is, indeed, marvellous how the consumption of gas increases; it seems to have an elasticity as great as that of gas itself, and that, too, in districts where, to all appearance, every requirement has been met, and where it is not being applied to new purposes. Yet there are places where it appears to have attained its maximum, and in these, new means must be found for extending business. Let us hope that Mr. Watson may be able to indicate some which are thoroughly good and practical.

GAS LEGISLATION IN THE PAST YEAR.

Nothing has occurred during the past twelve months materially affecting the interests of gas companies as a whole. The cost of coals has returned to nearly what it was before the panic of 1872, and I believe is now about as low as we are ever likely to see it. Some classes of cannel are cheaper than they have been for 25 years. Iron, too, is extremely low, and many companies are taking advantage of this fact, and are renewing and extending plant freely; and, while the staple articles of manufacture have been cheap, the residual products have not only maintained a value greater than they possessed prior to the panic, but that of tar and ammonia has considerably increased. Consumers are reaping the benefit of these favouring circumstances, many companies being now enabled to sell gas cheaper than they have ever done before. I said *nothing* had occurred materially affecting the interests of gas companies, as I do not think I need except the decision come to by a committee of the House of Commons last June, which led to the adoption of what is known as the "sliding scale" by the Commercial Company, and since then by The Gaslight and Coke Company; nor need I except the "auction clauses" which have been forced upon the last-named company this year, and which will doubtless be introduced as a condition in any grant of further powers to any company who may be applying to Parliament. I am far from thinking that the "sliding scale" of dividend will prove the panacea promised by its concoctors. Let there be but a few prosperous years, and a dividend approaching 12 per cent., and the outcry against the companies, and the agitation for some new legislation, will be as great as ever. In the matter of the "auction clauses," there are those who argue strongly in their favour, while there are others who are as staunchly oppose to them. Without entering into the argument, I am inclined to think that those in favour have the best of it, if it be only that the adoption of the said clauses does away with a prolific source of grumbling.

INVENTIONS AND DISCOVERIES.

New Inventions.—Of these there have been somewhere about the usual number relating to the manufacture, purification, measuring, carburetting, regulating, distributing, testing, and burning of gas, and I think fully the ordinary proportion will not get further than the "provisional protection" stage. There are, however, some which are really valuable; time will only permit of my mentioning one or two. A "Washer," by Mr. G. E. Saville, of Sowerby Bridge, a diagram of which is exhibited on the wall, and by which, as you can readily see, the gas is brought into very intimate contact with the water, and that without much increase of pressure. A vessel 8 feet square, with the working part only 20 inches high, giving 1600 lineal feet of dip, 830 superficial feet of wetted surface, and 250 feet of square water area, and throwing about 1½-inch pressure. I am told that gas free from ammonia, and containing comparatively little CO_2, is obtained by its use, while the water used escapes as very strong liquor—20 oz. to 30 oz. Another instrument of the same kind, by Mr. R. O. Paterson, of Cheltenham, is said to be very effective, the construction of which, however, I am not acquainted with.

Messrs. C. and W. Walker, of Donnington, have brought out some further Improvements in the Distributing Apparatus of scrubbers, an Improved Centre-valve, and Plate-planing machinery, by which they are enabled to provide and erect purifiers and tanks with planed and surfaced joints as cheaply as with the old-fashioned rust joint. You will see some 24 large purifiers on this plan at Beckton, and will be able to judge of the advantage or otherwise of the system for yourselves. The same firm has also introduced a very useful instrument, the invention of Mr. Drory, of Lille, called a "Gas-Testing Cock." A sample, I believe, lies on the table.

A "Retort-Charging Apparatus," by Mr. J. W. Whitaker, of Wakefield, which is a simple means of enabling two men to work an ordinary scoop, and by the use of which very small works can enjoy the benefit of scoop charging, and it is said a saving of about £2 per mouthpiece per annum in wages.

An "Illuminating Power Meter," by Mr. Sugg, and also a "Large Station-Meter," without a case, and several improvements in burners, by the same gentleman; samples or models of which are in the room, and I have no doubt Mr. Sugg will gladly afford any explanation or information that may be desired.

And lastly, "A Process of Purification," by Mr. W. Marriott, of Huddersfield, in which he proposes to scrub or wash the gas with a bisulphite of ammonia, and precipitate all the sulphur contained in the gas. The bisulphite of ammonia is to be prepared by saturating ammoniacal liquor with sulphurous acid, obtained by burning brimstone. It strikes me there are grave difficulties in the way of using this system, and one great objection to it is, that is does not touch the CO_2.

I ought to mention here a patent kiln with a reverberatory furnace, by Messrs. Ladelle and Thompson, for re-burning the waste lime from the purifiers. A pair of these may be seen at the London Gas Company's works, at Nine Elms.

I cannot close without drawing your attention to a discovery made by Mr. W. Crookes, F.R.S.—namely, that "light is found to be capable of direct conversion into motion;" or, in other words, that light possesses a mechanical action. As producers of light, we are deeply interested in all its properties. This attribute of it is likely to be turned into account in determining its own intensity or illuminating power. The discovery, however, is so recent, and the instruments required being necessarily very delicate, its application in a practical and workable form has not yet been accomplished. The perusal of a lecture on the subject by the discoverer, as published in the *Quarterly Journal of Science*, will amply repay any of you.

And now, gentlemen, I have done. I have somewhat exceeded the time I allowed myself, though I have omitted much that I should like to have said on some of the subjects noticed, and have left other topics altogether untouched which I might have dwelt upon. I have to thank you for your attention, and to ask again that you will aid me in the discharge of the duties that remain.

The PRESIDENT resumed his seat amidst loud cheers.

PREMIUMS FOR PAPERS.

The PRESIDENT: I have now much pleasure in announcing the award of premiums for papers read at the last annual meeting. The adjudicators have reported to the committee the satisfaction they felt in being able to recommend that all the premiums should, on this occasion, be allotted. The first in order of merit, in their opinion, was the paper read by Mr. William Cleland, of Liverpool, on "Economy of Force in Gas-Works in Reference to Condensing, Exhausting, and Scrubbing." In the opinion of the adjudicators, Mr. Cleland is entitled to the "President's Medal, 1873." The second premium they award to Mr. George Livesey, for his paper on "Hills's Liquor Process for Purifying Gas;" the third they award to Mr. John Douglas, of Portsea, for his paper on "Systematic Testing of Consumers Meters;" and the fourth they award to Mr. George Anderson, for his paper on "Building and Heating Retorts." The three last named are entitled to the premiums of £10, £7, and £3 respectively.

APPOINTMENT OF SCRUTINEERS.

Mr. Charles Horsley, of London, and Mr. Bailey, of Camborne, having voluntarily offered their services, were elected scrutineers of the ballot-papers for the election of officers and committee of the Association for the ensuing year.

The reading of papers was then proceeded with. We name them now in the order in which they were read, reserving their publication and the report of the discussions thereon, according to custom, for succeeding numbers.

The first paper read was by

Mr. T. TRAVERS, of Cork, on "Piece-work or Day-work, as Applied to the Reduction of the Labouring Force in Gas-Works."

Mr. G. LIVESEY read a paper on "Further Experience with Concrete Tanks."

Mr. R. P. SPICE read a paper on "The Comparative Working Results of West's Mechanical Stoker."

Mr. C. HUNT, of Birmingham, read a paper on "Washers and Scrubbers."

The SECRETARY read a paper, prepared by Mr. W. Richards, of London, on "Heating Retorts."

In the evening a lecture was delivered before the members, by Mr. W. MATTIEU WILLIAMS, F.R.A.S., F.C.S., &c., on "The Different Qualities of Iron and Steel, their Manufacture and Applications."

WEDNESDAY, JUNE 14.

The PRESIDENT took the chair this morning at ten o'clock, and the first paper read was by

Mr. C. WOODALL, of London, on "The Reduction of Sunday Labour."

Mr. G. LIVESEY read a paper on the question, "Is the Reduction of the Sulphur Compounds worth the Cost and Trouble it Entails?"

Mr. WARNER, of South Shields, read a paper on "Mains and Services."

Mr. FISON, of Ilkley, read a paper on "A New Self-Regulating Exhausting Apparatus."

Mr. W. D. CHILD, of London, read a paper on "The Valuation of Ammoniacal Liquor."

In consequence of the absence of Mr. J. Watson, of Sydenham, a promised paper by him, on "The Best Means of Extending the Use of Gas," was passed over; and, for want of time, a second paper by Mr. W. Richards was taken as read.

ESTABLISHMENT OF A BENEVOLENT-FUND.

The PRESIDENT then called attention to the question of the establishment of a benevolent-fund in connexion with the Association. He reminded the members that in his opening address he had mentioned the matter, and stated that offers of donations towards such a fund had been made to him by gentlemen not connected by membership with the Association. He might add that Mr. Cutler, who kindly promised £50 to the object a year or two ago, had renewed

his promise; that Mr. Penny, who promised 20 guineas, had also renewed his promise, and that Messrs. Stephenson Clark, and Co., had written to say that they regarded the establishment of such a fund, in connexion with the Association, as very desirable, and they would be extremely pleased if the members would accept a donation from them of 100 guineas. (Cheers.) Several other promises were made two or three years ago, when the question was before the Association, and he (the president) had no doubt that when the work was really taken in hand, the friends would renew their offers, and perhaps increase their donations. Having introduced the matter, he would leave it in the hands of the meeting.

Mr. SPICER: Gentlemen, I have been asked to say a few words upon this subject, which has been so kindly introduced to our notice by the president. And knowing that I should be asked to speak upon it, I asked my friend, the secretary, to show me the minutes relating to the matter, which he has done, and to which I shall refer. I find at the beginning these two words: "Benevolent-Fund," and I am asked to preach a short sermon from this short text. But I am quite sure that one of those words alone—the word "benevolent"—would be sufficient to enlist your kind consideration. The moment I saw the word, I was reminded of a story I once picked up—I do not know where—about a Turkish preacher who was called upon to preach a charity sermon, in a mosque some distance from Constantinople. He took for his text the word "Charity," and he said, "Dearly beloved, do you know what I am going to say to you?" The response was "No." "Then," said he, "I decline to tell you." On a second occasion, being asked to preach a charity sermon to the same body of the faithful, he began by asking, "Do you know what I am going to say to you?" This time the reply was "Yes." "Then," said he, "there is no occasion for me to tell you anything about it." A third time he stood before them on a similar occasion, and when he asked his former question, they thought to catch him; so some said "No," and others "Yes." "Well, then," said the preacher, "let those who know tell those who don't know, and I need say nothing myself on the subject." I am much inclined to imitate this Moslem preacher, and, instead of making a speech, to content myself with giving you the one word, "Benevolence," and ask you to think about it, to talk about it, and to consider amongst yourselves how to give it a practical application in connexion with this Association. Now, I take it that benevolence is a much better word than charity. This is not a matter for charity; it is a matter which it is desirable we should consider in the light of self-help. I should be sorry to say one word that would discourage the spontaneous offer of handsome contributions from these outside who are well disposed towards us as a public body; indeed, I hail such contributions as those announced by the president as tokens of good will towards us. These gentlemen have read in the JOURNAL OF GAS LIGHTING that the question of establishing a fund is to be brought forward at this meeting, and they, being gentlemen who do business with gas companies all over the country, are pleased to have an opportunity of showing their good will towards us, and to express it in this handsome manner. But what we want to accomplish does not so much depend upon our getting large contributions from without, as upon our organization amongst ourselves, on a sound footing, of a system by which the funds we become possessed of shall be made available for those of our body who, in the ordinary dispensations of Providence, are rendered fit subjects to be relieved. Gentlemen, there are certain ills to which flesh is heir; we are all liable to misfortunes, and there is nothing in the shape of charity attached to the idea we are now mooting, of the formation of a fund to relieve those of our number who may be overtaken by calamity. I feel, and I believe there are many of us who feel, that it is hardly to our credit, as a public body, that we have not before now organized a fund for this purpose. The suggestion has been made on more than one occasion, and some steps have been taken in the consideration of the question, but we have fallen short of any definite action, not, I am sure, from the want of kindly feeling on the part of the committee, but owing, I fear, to the want of tact and skill in the inception or broaching of the scheme. When the question was propounded some time ago, the responses of members were not of that broad and decisive character which the committee felt would justify them in taking further action. I was not a member of the committee at the time, but I know they felt that they did not receive so much support as they needed to urge the scheme upon the general body, and they waited, as Members of Parliament wait—whether they are Conservatives or Liberals—for the exercise of a pressure from their constituency, before again taking it up. But now they feel that the time has come for a reconsideration of the subject, and they believe, if you resolve upon it today, that, during the current year, our benevolent-fund will assume a shape of a highly satisfactory character. So much for the general question; but now I want something more definite. I am afraid the idea has got abroad amongst the members that large subscriptions will be necessary if this fund is to be properly carried out. Now, I do not think they will be at all necessary. For myself, I should prefer to give a certain subscription for a time—say £10 a year for five years, by way of example—rather than a single donation of £50. Many persons may, perhaps, say, "We are not able to give £10 at once, but we will give £5 for two years,"—and so I would go down the scale to subscriptions of £1, or whatever you may be disposed to contribute. I know there are many amongst us in responsible and respectable positions, who would be willing to contribute one, two, or three guineas a year, for a limited period, so as to set on foot, and place in a sound condition, a fund such as we are now talking about. I shall ask you to hold up your hands, however, in favour of the general idea, that it is desirable to establish a fund, without pledging you to any definite sum for any period, so that we may at once get the thing put upon its legs. We are practical men, and men of science, and though science and common sense do not always go together, there is no reason why they should not, and I now put it to you, that we should at once wipe out the stain upon our reputation as an Association, that for thirteen years we have been in existence, and have not yet made any organized attempt to assist our unfortunate brethren in their pressing time of trouble. If this idea receives a kind and generous response from you, the committee will deliberate upon, and be prepared to lay before you, a plan or constitution for giving effect to your wishes. The secretary has shown me a draft report on the subject, which was drawn up in 1873, and he suggests that it would be well to have it read, so as to show what attempts have been made in the past, in the shape of more concentrated effort in this direction.

The SECRETARY then read the following draft report made to the Committee of the Association in June, 1873:—

Gentlemen,—In accordance with the resolution passed at the last annual general meeting, approving the principle of establishing a Benevolent-Fund, and deputing the committee to consider the arrangement and disposal of such fund, together with the regulations necessary for its management, and to report thereon to this meeting, your committee have the pleasure to submit the following:—

For the purpose of ascertaining how many subscribers there would be, and the probable amount of their subscriptions, a circular was sent out to each of the members. The result was that 108 replies were obtained. These may be classified as follows:—

12	express their willingness to subscribe annually	.	£0	5	0	= £3	0	0
13	"	"	"	.	0	10	0	6	10	0
27	"	"	"	.	0	10	6	14	3	6
3	"	"	"	.	1	0	0	3	0	0
24	"	"	"	.	1	1	0	25	4	0
2	"	"	"	.	2	0	0	4	0	0
7	"	"	"	.	2	2	0	14	14	0
1	"	"	"	.	2	12	0	2	12	0
2	"	"	"	.	5	5	0	10	10	0
1	"	"	"	.	10	10	0	10	10	0
	These would amount to							£94	3	6

To the foregoing are to be added answers from eight persons, who say they would be willing to subscribe what is usual, and three declare their readiness to contribute more than the sums they have named, if necessary, so that reliance may be placed upon the receipt of £100 per year as subscriptions from those who have already replied.

Further, your committee have the pleasure to state that they have had offered to them, as donations, from

Messrs. S. Cutler and Sons	£50	0	0
A. Penny, Esq.	21	0	0
H. M'L. Backler, Esq.	10	10	0
F. J. Evans, Esq.	10	10	0
W. H. Broadberry, Esq.	1	0	0

These sums, in addition to that so kindly offered by your president, would make £193.

The committee expected that the number, and consequently the amount, of the subscriptions would have exceeded the sum named, but, on inquiry, they are led to believe that many refrained from replying until they knew something more of the scheme upon which the fund was to be founded, and the manner in which it should be applied.

It is to be regretted (especially by your secretary) that in the circular issued no invitation was given to present donations as well as subscriptions, as it is quite possible that the donation list might have been considerably extended had this been the case. The object, however, was to ascertain more particularly the general feeling in the matter, rather than the amount to be collected, and the oversight may, therefore, be easily rectified in any further circular to be published.

On the whole, your committee consider that the application has met with a very favourable response, three persons only having objected to the proposal, and they, therefore, recommend the establishment of a fund, to be called "The Benevolent-Fund of the British Association of Gas Managers," for the purpose of affording assistance to necessitous members and their families, and to the families of deceased members, or to any one, or the family of any one, who may have been a member, who has paid his subscription for five years consecutively, whether such recipient shall have been a contributor to the fund or not. The rules and regulations which your committee recommend would be based upon those referring to a similar fund in connexion with "The Institution of Civil Engineers," established in 1864, and which has been found to work well, the heads of the principal rules being as follows:—

The fund to be supported by donations, bequests, and annual subscriptions of not less than 10s. 6d. All donations and bequests to be considered as capital, and invested in the names of the trustees. Annual subscriptions, dividends, or interest arising from capital, to be considered as income, and available for the assistance of applicants, the residue, after paying expenses, to be invested at the discretion of the committee, who shall also have the power, after the first year, to devote any sum not exceeding twice the income of the preceding year to the relief of the distressed.

Subscribers to be entitled to one vote for every 10s. 6d. subscribed, and donors of not less than £5 in one payment shall have one vote, and a further vote for every £5 so given. Votes to be recorded personally or by proxy.

The committee to consist of the president and six members, who are contributors; to be elected at the annual general meeting, in conformity with the present rules of the Association.

The committee to have full power to make grants of assistance, but not such as shall anticipate the income of future years.

The committee to be allowed to make regulations not inconsistent with the rules established, and to call meetings besides an annual general meeting whenever circumstances arise rendering it necessary.

The current income to be paid to the treasurer, and the accounts audited yearly.

In conclusion, your committee are particularly desirous to disabuse the minds of any who may be under the impression that the fund so formed would bear any analogy to a benefit society, or sick club, which, in the opinion of your committee, would greatly derogate from the position the Association has attained. It is also desirable to state that the committee do not contemplate at any time granting annuities, but simply to afford relief to the necessitous, and especially in such cases as cannot be met, or provided for, by ordinary life assurances.

The PRESIDENT: I dare say this report has taken you by surprise. It appears to have been drafted by Mr. Bennett, and submitted to the committee in 1873, who were requested to carry out the resolution of the general meeting of members in the previous year. He has not explained why it was not adopted and published, but he has given me some hint as to why it was not, and I think your forbearance in the matter would be better. Had this report been adopted, it would have carried out the resolution you passed almost unanimously in 1872. The report which was really brought before the meeting by the committee in 1873, instead of this, was a very short and curt one indeed, and it was found fault with in the JOURNAL OF GAS LIGHTING a few weeks ago. However, as far as that report is concerned, we had better let the matter stand where it is.

Mr. HUNTER said if the members were all agreed as to the necessity of such a fund, it was desirable to have further discussion of the matter. It appeared that, as an outsider, he laboured under a delusion or mistake, because he had always supposed that the committee were somewhat opposed to the establishment of a Benevolent-Fund; but since he had been on the committee he found that they were as desirous as any members of the Association that such an organization should be set on foot. Probably the principal hindrance in the way, hitherto, had been the idea prevailing, that there would be a necessity for large subscriptions. But he believed this necessity did not exist; and while they were much obliged to those gentlemen who had offered the handsome sums named by the president, it would not be required to lay a heavy burden of payment upon individual members of the Association. There was, he believed, every year a considerable surplus of ordinary income over expenditure, which, if applied to this purpose, would be almost sufficient to meet the small number of cases they would have to relieve. He had no doubt also many gentlemen would be found willing to contribute a guinea annually to the funds of the Association, who now only gave half a guinea, because they knew that the present income always exceeded the expenditure, and, therefore, a larger subscription was not required. With such an augmentation of subscription, all they desired could be accomplished. He confessed that he very much disliked to see public appeals made, as was the case in the JOURNAL lately, on behalf of some unfortunate brother, and should be glad if the necessity could be avoided. At the same time, he believed that gas managers generally were in tolerably easy circumstances, and he did not anticipate that there would be, at any time, a very large number of applicants upon the fund.

Mr. WARNER felt it to be a very grave and serious reflection upon the Association, that, after the resolution adopted at the annual meeting in 1872, to establish a fund for the relief of distressed members, no attempt had been made to carry the thing into effect. But he was willing to adopt the advice of the president, and "let bygones be bygones." The present was his hour of triumph. It had been for years his ambition to see this work undertaken in earnest, and he believed, as the result of the discussion that day, there would be no further postponement of the matter. He was indeed glad to think that no more "Christmas Appeals" would have to be made to meet cases of distress among gas managers. A member of the West of Scotland Association, writing to him respecting the recent appeal in the JOURNAL, remarked that "it is very disgraceful to the British Association that such a case as that mentioned in the 'Christmas Appeal,' could not be assisted by them, and the fact of a small and poor Association such as ours being able to do so, ought to shame them into the formation of a Benevolent-Fund." He was bound to take a portion of that shame upon himself, and could only now regret that he had not more often and more earnestly pressed upon his fellow-members the duty of doing something in this direction. However, he would say again, "Let bygones be bygones, and do not let us separate on this occasion until some practical conclusion has been arrived at." He thought the first step should be to raise the subscription of members to a uniform rate of one guinea. They would thus obtain the nucleus of a fund, which could be increased from time to time, as opportunity served.

Mr. FRITH remarked that when this question was brought forward a few years ago, the urgency of it was not so much felt, as the members then had no cases before them to guide them to a decision. Latterly, however, there had been an appeal to their sympathies in the JOURNAL, and since that case appeared, another and most painful one had come under his own attention privately, some particulars of which he proceeded to give. From his knowledge of this case, he was enabled to speak feelingly on the question; and

though, because of absence of experience, he could not blame himself for not strongly advocating, in the past, the formation of a Benevolent-Fund, he should feel that he stood condemned if he did not now urge the adoption of some practical steps by the Association towards this object. A compassionate regard for the widow and the fatherless in their affliction, was enjoined by The Book upon those who desired, as he trusted all present desired, the smile and blessing of God; and when they looked around, and saw how much was being done by various sections of the community to provide for the orphans of destitute members of their bodies, they must, he thought, feel some desire that, in their own community, an organization should exist for an analogous purpose. He would be happy to give a donation of £5, and subscribe a guinea per annum to the proposed Benevolent-Fund.

Mr. WARNER having made a formal motion to the effect that the annual subscription of members of the Association be increased to one guinea, and the motion having been seconded,

The PRESIDENT expressed an opinion that the proposal was somewhat out of place, and quite unnecessary. At present the half guinea paid by a large number of members, and the guinea paid optionally by some others, very nearly met all the expenses of the Association, and if by carrying the motion they doubled their income, it would only result in their having a large surplus, which could not be dealt with in the way proposed.

Mr. ELDRIDGE said if the motion was pressed he should move, as an amendment, that it is not expedient to interfere with the present arrangement as to the annual subscription. He wished also to say that in his opinion it would be unwise to mix up the affairs of the Benevolent-Fund with those of the Association.

Mr. G. ANDERSON thought it was not necessary, in dealing with this subject, that they should wander into the region of sentiment. He approved highly of the benevolent intention of those who had spoken, and did not require any argument to convince his judgment that it was desirable to assist their needy brethren as they had opportunity. But while he would fall in with whatever the present meeting decided upon in this matter, he would state frankly what his private conviction was in reference to the establishment of a Benevolent-Fund in connexion with the Association. He had been personally against it, and his reasons had been these. The Gas Managers Association was a shifting body, from year to year, meeting in different places, and the members of their committee were resident in various parts of the country. If applications came to them for relief, he did not see practically how the thing could be worked. It was very different in the case of such societies as the Society of Engineers, whose location was always in London, and he feared that difficulties would arise in the administration of the fund. With reference to increasing the annual subscription of members, he remarked that he had been paying a guinea a year hitherto, like some other fools, when, as it seemed, half a guinea only was necessary. He certainly would not have done so had he known it, as he had no desire to appear to want to be better than his brethren. At the same time he could not help thinking that the Association were now sufficiently important to entitle them to raise the subscriptions to a guinea. When the 10s. 6d. scale was determined on, they were but a small and poor body, now they formed a magnificent organization, and were entitled to raise their price accordingly. If, as the result of carrying the motion, they had a considerable sum of money to spare, he should like to see the Association do what another society with which he was connected did—viz., when any necessitous members wishe dto obtain assistance, they made their applications privately to the committee, who took upon themselves to inquire into the circumstances and grant relief, so that only a few persons knew who the parties were to whom assistance was rendered. Any one who was in trouble desired to have his necessities kept as far from publicity as possible, and cases of adversity were constantly occurring, even amongst those who had done their best to get through the world without help. He thought, therefore, that if the committee of the Association, having the means placed at their disposal, were empowered to inquire into any cases brought under their attention, and to give assistance according to their judgment, everything would be done that would need to be done. Not, let it be understood, that he would offer any objection to the formation of a Benevolent-Fund, if, in the opinion of members generally, it was thought desirable; but it must be remembered that they were a scientific body, and this proposal might somewhat alter their position. If such a fund were formed, he would be happy to give something towards it, and, if it were not, he would be happy to give power to the committee to help necessitous cases in a quiet and unobtrusive manner.

Mr. PATERSON, of Cheltenham, asked whether he was right in the opinion he entertained, that it was not competent for this meeting to make an alteration in the rules of the Association without notice. The rules had fixed the subscription at half a guinea, and, in the absence of a previous intimation, it would hardly be fair to increase it. For himself, he should be very willing to assist a scheme for the establishment of a Benevolent-Fund.

Mr. SYMS, of Rochester, thought it would be well to follow the old lines of the Association, and, fixing a low rate of subscription, leave it optional with the members to pay more. There were some who were better able than others to pay a higher rate, and it would not be wise lightly to try and alter the present arrangement. He would suggest, with reference to the Benevolent-Fund, that a committee be formed to organize a scheme, and to solicit subscriptions from members and others of 5s. a year and upwards.

Mr. C. WOODALL said it seemed to him that nothing more could be done than to make another reference to the committee. He said this with great regret, for he felt the most entire sympathy with Mr. Warner, who had succeeded in bringing to an issue that for which he had been working so long. But it appeared to him that they were placed in a somewhat awkward position. A report had been read to this meeting which really had never been before the committee. At the present time a change had come over the spirit of the matter, and there was a general desire evinced to form a Benevolent-Fund in connexion with the Association. Certainly, the replies received by the committee in office at the time referred to justified the course they pursued. So far as those replies indicated the opinion of members of the Association, it was opposed to the establishment of such a fund. Under these altered circumstances, it seemed to him that there was no other course open than to make another reference to the committee, with instructions to report to the next meeting.

Mr. SPICE said he had listened with great interest to the discussion which had taken place upon the proposition he ventured to make, and which, he was happy to think would be carried unanimously. The proposition was that a Benevolent-Fund should be established, and this, he believed, without exception, every one agreed in. Then came the question of the initiation of the necessary measures to secure that end. All honour, he would say, to their excellent friend, Mr. Warner, for his very persistent efforts to accomplish the purpose upon which he had so long set his heart. It must be highly gratifying to him to find his object in a fair way of accomplishment. But he (Mr. Spice) differed with his friend on the question of raising the subscription to the Association, in order to provide the necessary sums for the Benevolent-Fund. He doubted the policy altogether of altering the existing rule, and he doubted still more whether, if the subscriptions were "levelled up," they could, according to the constitution of the Association, apply the surplus money to the purpose in view. Looking at the subject in all its bearings, he thought the proper way to proceed would be to adopt some such resolution as he would now propose—viz., "That the committee of the Association be at once directed to apply to all the members, and others interested in the gas profession, for subscriptions and donations towards a Benevolent-Fund, and that they also be instructed to bring forward a definite scheme and set of rules for its government." He would add these few words as a rider, or as an understanding, to be entered on the minutes—"That any funds contributed shall be held in trust by the committee, until the members of the Association shall have approved of the said rules."

Mr. SYMS seconded the motion.

Mr. WARNER said his idea was to give a tangible form to the resolution of the members respecting the Benevolent-Fund, by providing the committee at once with means, and he would afterwards propose that power should be given them to assist any case that came before them before the next meeting of the Association.

The PRESIDENT said he thought Mr. Warner's views would be met if Mr. Spice would add to his motion a few words, giving the committee a discretion to meet, within certain limits, which could be defined, any cases of distress coming before them within the next year.

Mr. HARTLEY thought that Mr. Warner's kindness of heart had carried him a little too far in his desire that assistance should be forthcoming to those who might apply for it in the coming year. But he would remind him that, if subscriptions were to be solicited, the secretary would be for some time occupied in getting out circulars, and in correspondence on the subject; and then there would be a further interval before the subscriptions promised were received. Therefore, to enter into any undertaking now, giving the committee power to deal with a fund not yet formed, was hardly a proper arrangement. Whilst cherishing the most sincere feelings of sympathy with any brethren who might be in distress, common sense and prudence must dictate the propriety of not authorizing the payment of sums of money not likely to be received for some months to come. If any cases of necessity arose, before the committee were in possession of funds and had drawn and settled rules for their administration, they must be left to the benevolent feelings of individual members of the Association.

Mr. SPICE said he must adhere to the verbal addition made to the motion. He was influenced by the feeling that members might decline to subscribe their money until they saw how it was proposed to be distributed, and had discussed the rules and regulations under which the Benevolent-Fund was to be managed. And, inasmuch as at least one-third of the year must elapse before subscriptions to any amount would be received, there was really very little necessity to arm the committee with power to disburse it.

The PRESIDENT, in reply to an inquiry, said the annual general meeting of members had power to alter the rules of the Association if it was thought desirable.

The amendment of Mr. Warner was then put to a show of hands, and negatived.

Mr. C. WOODALL proposed another amendment, to the effect—"That it be a recommendation to the committee to prepare a scheme for the formation of a Benevolent-Fund, and submit the same to the next meeting."

The amendment having been seconded,

Mr. PENNY said he agreed so fully in the motion made by Mr. Spice that he could not but regret the introduction of the amendment. He was clearly of opinion that the wiser course would be to get the funds raised and the committee organized, so that next year they would be in a position to assist any one who might require it.

Mr. HELPS, of Bath, hoped the scheme would take the form of a really Benevolent-Fund, and be applicable to granting annuities to decayed members, as well as for giving promiscuous assistance in cases of distress.

The PRESIDENT thought this suggestion was altogether beyond the object contemplated in forming a Benevolent-Fund.

The amendment was put to the meeting and lost, and the original motion carried by an overwhelming majority, amidst loud cheers.

MEMBERS IN ARREAR.

In accordance with a resolution adopted at the last annual meeting, the secretary read a list of the names of members whose subscriptions had fallen into arrear. The resolution was as follows:—"The committee shall bring before the members, at their annual general meeting, the names of such persons as may have allowed their subscriptions to fall into arrear for two consecutive years, exclusive of the current year, whereupon the defaulters shall be struck off the list, and cease to have any advantage, right, or privilege in the Association, unless sufficient cause is shown to the contrary. In the event, however, of any such member paying up all the arrears, he shall be entitled to readmission without re-election." The list contained the names of about 40 members, and the amount of subscription in arrear was about £80.

The SECRETARY, in answer to inquiries, said that in many instances the addresses of the members in default were not known. In all cases in which the address was known, a letter had been sent to the defaulters, informing them of the rule, and inviting them to pay up.

Mr. PATERSON moved that the names just read be removed from the list of members.

The PRESIDENT said no resolution was necessary. By the rule the persons ceased to be members on the names being read.

TIME AND PLACE OF NEXT MEETING.

It was resolved, without any discussion, that the next annual meeting be held on the second Tuesday in June, 1877.

On the question "Where shall we meet?" Mr. WILLEY proposed Plymouth, Mr. ELDRIDGE Newcastle-on Tyne, Mr. WARNER Bristol, and Mr. WOODALL Paris.

By a large majority, it was, after a brief conversation, agreed to meet in the city of Bristol.

ELECTION OF COMMITTEE AND OFFICERS.

The SECRETARY read the report of the scrutineers as to the result of their examination of the ballot papers; from which it appeared that the following gentlemen had been elected for the ensuing year:—

President.—Mr. R. P. Spice.
Vice-Presidents.—Mr. John Douglas, Mr. Corbett Woodall, and Mr. William Foulis.
Treasurer.—Mr. Henry Newall.
Secretary.—Mr. W. H. Bennett.
Committee (new members, to replace those going off by rotation).—Mr. F. Livesay, Mr. J. Storer, Mr. R. O. Paterson.
Finance Committee.—Mr. G. T. Livesey, Mr. Eldridge, and Mr. G. W. Stevenson.
Auditors.—Mr. S. P. Leather and Mr. A. Hersee.

VOTE OF THANKS.

On the motion of Mr. MEAD, the thanks of the Association were voted to the members who had prepared and read papers during the present session.

On the motion of Mr. HUTCHINSON, seconded by Mr. WILKINSON, the thanks of the meeting were given to the scrutineers for their service.

Mr. HARTLEY proposed, and Mr. MARTIN seconded, a vote of thanks to the committee for the past year, which was carried unanimously.

On the motion of Mr. SIMPSON, seconded by Mr. FRITH, thanks were then voted to the treasurer.

The PRESIDENT: I have now to ask your acceptance of another vote of thanks, which I am sure you will adopt with equal unanimity. It is—"That the best thanks of the meeting be presented to the Council of the Society of Arts, for granting to the Association the use of their rooms; and to Mr. P. Le Neve Foster, the secretary of the society, for the arrangements made by him, and which have conduced so much to the comfort of the members, and that the secretary be instructed to communicate this vote to the society."

Mr. G. LIVESEY seconded the motion, which was cordially adopted.

Mr. G. LIVESEY said there was one other vote of thanks to be passed. A

gentleman whom they all respected had been taking a prominent part in the proceedings of the assembly, whose services to the Association could not be overlooked; he referred to their worthy President. (Loud cheers.) The cordial manner in which this suggestion had been received would save the necessity for making a long speech in support of the motion he was about to submit to the meeting. He was sure that his friend Mr. Morton did not require any encomiums, but it was only due to him to say that he had conducted the business of the Association with great ability, and with the utmost courtesy and justice to every member. He (the speaker) knew that Mr. Morton had been animated by an earnest desire that every one should have a fair hearing, and throughout the sittings he had given the fullest opportunity for discussion. On this ground alone he was entitled to their thanks. They were, also, much indebted to the President for his admirable address. In that he had set a precedent which his successors might, with advantage, imitate. Succeeding Presidents would have to think twice before they ventured before the Association with inaugural addresses which took an hour each to read. He (Mr. Livesey) had been a culprit himself in this matter in the past, and could only console himself now with the reflection that he had been in good company. Mr. Morton, however, had set a good example; he had given up half an hour of time that he might fairly have claimed, to make more room for those who wished to speak at these meetings. For his courtesy and kindness, and for the good service he had rendered the Association, he deserved, and would receive, a very hearty vote of thanks.

Mr. MAGNUS OHREN seconded the motion, which was put and carried unanimously, and with loud cheers.

The PRESIDENT: Gentlemen, the way in which you have received the motion proposed by my friend, Mr. Livesey, relieves me from the necessity of saying much. If I had consulted my own feelings, I should never have been in this chair. If I have performed the duties of my office to your satisfaction, I can assure you it gives me satisfaction. I am much obliged for the vote of thanks you have so cordially awarded me. I feel very great pleasure in witnessing the success of the meeting of the Association this year. I hope your proceedings have not suffered on my account. There is one thing we have to do before we close our sittings. I think it is due to those gentlemen who have offered donations to our Benevolent-Fund, that we should pass a vote of thanks for their generous offers, and request the secretary to convey the same to them.

The motion was put and agreed to.

Mr. C. WOODALL: In proposing the last vote of thanks, it is not necessary that I should employ many words. I propose a vote of thanks to our secretary, Mr. Bennett.

The PRESIDENT: I desire to second the motion. I have found Mr. Bennett a most indefatigable officer during my year of office.

The motion was put and cordially adopted.

The SECRETARY: Gentlemen, I am very much obliged for this expression of your good opinion. You have always received me so kindly, have given me so many words of encouragement, and have treated me with so much consideration, that it would be very extraordinary if I did not exert myself in endeavouring to win your approval in the discharge of the duties of my office. Your vote of thanks on this occasion will stimulate me in this direction, and I shall be happy if in the future I am still able to merit your confidence and approbation.

The annual dinner of the members took place on Wednesday evening, at the City Terminus Hotel, Cannon Street.

THURSDAY, JUNE 15.

This day was devoted to an excursion by steamboat to Beckton, where, by the courtesy of the directors of The Gaslight and Coke Company, an opportunity was afforded of inspecting these mammoth gas-works. As we have, in the two last numbers of the JOURNAL, given a full and exhaustive account of the Beckton station, accompanied by a general plan of the works, it is needless to add any further description here. The members of the Association paid their first visit to Beckton after their annual meeting in London in 1870, a few months before the works were in operation. A second visit was paid by them in 1872, since which time enormous extensions have taken place. On the arrival of the visitors on Thursday last, they were met at the end of the pier by the Hon. Howe Browne, the governor; Mr. F. J. Evans, a director, and former engineer of the company; Mr. Trewby, the resident engineer; Mr. V. Wyatt, the constructing engineer; and Mr. T. J. Bush, the deputy-engineer, and received a hearty welcome. Forming themselves into parties, they were conducted over the various departments, and spent a considerable time in their inspection. They then re-embarked and proceeded down the river to Rosherville, where they spent the remainder of a "happy day," reaching London again shortly after eight o'clock in the evening.

LEEDS CORPORATION GAS SUPPLY.

At the Meeting of the Leeds Town Council on Monday, June 12—the MAYOR (Alderman Croft) presiding,

A deputation attended from the Leeds Chamber of Commerce, and presented the following memorial on the proposed alteration in the scale of discounts to large consumers:—

To the Mayor, Aldermen, and Common Councillors of the Borough of Leeds.

The Leeds Chamber of Commerce, representing the largest consumers of gas in the borough, beg respectfully to memorialize the council on the proposed alteration and diminution in the scale of discounts allowed on gas accounts to large consumers. The Chamber of Commerce took some action in reference to this matter at the time the Act of Parliament empowering the corporation to purchase the gas-works was applied for, and in consequence of this action the corporation obtained the authority to introduce clause 23 into the bill, permitting the allowance of discounts. In consideration of the general understanding thus come to, opposition to the Act on the part of the large consumers was withdrawn, and the scale of discounts as under was fixed by the corporation:—

On a half-yearly account of £5 and under	£15	. . . .	1½	per cent.
,, ,, £15	,,	£30	2½	,,
,, ,, £30	,,	£45	3½	,,
,, ,, £45	,,	£60	5	,,
,, ,, £60	,,	£75	6½	,,
,, ,, £75	,,	£90	7½	,,
,, ,, £90	,,	£105	8½	,,
,, ,, £105	,,	£400	10	,,
,, ,, £400 and upwards		. . . .	15	,,

It was believed that this was to be considered as an arrangement not to be disturbed, except under extraordinary circumstances. Twenty-five per cent. discount was allowed by the old companies, against 15 per cent. at present by the corporation. It will be a very serious change if the proposal to reduce the discount again to only 7½ per cent. be carried and enforced. Large consumers are manifestly the best customers; the ease of collection, the small loss through bad debts, and also the less waste in distribution, outbalance considerably the moderate allowance made in the way of discount. By the action of the old companies certain large consumers were induced to discontinue the manufacture of their own gas; but if the present policy of reducing discounts be carried out, it is very probable that they will recommence the manufacture, and that they will be followed by others; and at this day the large consumers are very much more numerous than they were at the period referred to. If a multitude of small gas-works were established, it would be a nuisance to the town. In a neigbouring city, not so favourably situated as Leeds for the purchase of coal, a railway company was induced, by similar action on the part of the City Council, to put down works for the manufacture of its own gas, and it now obtains its supply of gas at the rate of 1s. 3d. per 1000 feet, as against a former charge of 3s. This is after allowing a liberal sum for depreciation of plant, &c.

In Newcastle the discount to the largest consumers is 15 per cent. In Birmingham 6d. per 1000 feet, equal to about 15 per cent. In Bradford the discount to large consumers is 20 per cent.—the price of gas being, in Newcastle, 3s. per 1000 feet; in Bradford, 3s. 4d.,; in Sheffield, 3s. 1d.; and in Birmingham, 3s. 3d.

The change proposed will be detrimental to trade, and will operate against the working of mills and factories after dark in winter; and wherever it places the large consumers in a less favourable position than they are in as compared with other towns, it will prejudice the interests of both the employers and the workpeople in the town of Leeds. Your memorialists, therefore, earnestly pray the council not to make any change in the existing scale of discounts.

Signed on behalf of the Leeds Chamber of Commerce,

JAMES KITSON, Jun., Vice-President.
STEPHEN A. MARSHALL.
JOSHUA BUCKTON.
DAVID GREIG.

The memorial having been read,

The MAYOR informed the deputation that the memorial would be carefully considered by the council.

At a subsequent period of the sitting,

Mr. WRAY brought up the following recommendation from the Gas Committee, of which he is the chairman:—"That from and after the 1st of July next, the price of gas be reduced from 3s. 9d. to 3s. 4d. per 1000 cubic feet, and that the discount on gas accounts be altered and allowed from that date according to the following scale:—On a half-yearly consumption, £15 and under £60, 2½ per cent.; £60 and under £105, 5 per cent.; and £105 and upwards, 7½ per cent." In moving the adoption of the recommendation, he stated that the gas earnings last half year were £11,900, and this half year the committee thought they would earn £12,000, or nearly £24,000 for the year, and to meet this 6d. they would require something like £20,000. As the gas supply of Bradford was a subject introduced into the last discussion on this question, he might state that in Bradford the interest on plant was 3d. per 1000 cubic feet. In Leeds, the interest on plant cost the corporation something like 11d. per 1000 cubic feet of gas sold. If they could only be placed in the same position as Bradford, they should be prepared that day to take 2s. 9d. per 1000 cubic feet. Whatever might have been done in the past with their plant, the committee, he was confident, would endeavour to make the most of it hereafter. No doubt they would suffer for a year or two, but he felt convinced that Leeds would yet stand as favourably as any other town for the cheapness of its gas. Since 1871 their plant had been wholly renewed.

The motion having been seconded by Mr. NORTH,

Mr. SCARR moved, as an amendment, that the price of gas be reduced to 3s. per 1000 cubic feet, and that discounts be discontinued. He supposed that the Chamber of Commerce, which had been represented by the deputation, existed for the purpose of looking after the interests of its members, and, like all other institutions of a similar kind, invariably took care to get its pound of flesh if possible—two pounds if it could quietly do so. He wished to call the particular attention of the council to a few items as regarded those gentlemen who had just left them with the dreadful threat of withdrawing their custom. There were 86 such customers, who got 10 per cent. discount on 61,300,600 cubic feet, whilst the committee lost £1340 18s. on the transaction, and gave them in addition, for the patronage of their custom, £1166 7s. 10d. discount. For the 15 per cent. discount, they had 48 such customers—the *élite* of the lot—who consumed 52,144,200 cubic feet of gas. They lost upon them £1140 13s., and in addition gave them £1474 in discount. In 1874, they lost £10,998 out of £20,500 by supplying these discount customers. He asked those members of the Chamber of Commerce who sat in the council, supposing they were in business, and they were tied up by an Act of Parliament to supply their customers with certain goods, and then lost 2s. on every pound's worth of goods they supplied, if they wished to persuade him that any man in Leeds believed they would be so insane as to give such customers 3s. in the pound in addition for the patronage of their custom? If they took off these discounts it would make 2d. per 1000 feet difference.

Mr. WRAY: It will make £30,000 difference.

Mr. SCARR asked if it was right that the 50,738 customers who got no discount should be taxed at the rate of 2d. per 1000 feet in order that these select people, who used the gas for the benefit of their own business, might enjoy it. Let them take no notice of this selfish body.

Mr. JACKSON rose to order, and contended that it was not justifiable to attack a respectable body like the Chamber of Commerce in their absence.

Mr. SCARR thought that if these gentlemen came before them, wanting the price of gas regulated according to the importance of their trade, it was a principle they themselves never acted upon, and therefore there could be nothing disparaging to them in the statement he had made. He had every confidence that if they struck off these discounts when they came to the end of the official year, instead of being in the background they would have a surplus and lose nobody's custom.

Alderman TATHAM seconded the amendment.

Mr. SPARK said it was altogether a fallacy to suppose that the corporation could take off 9d. per 1000 feet in the price of gas, and also entirely knock off the discounts. The 9d. reduction alone would represent a loss of £30,000, whilst the abolition of discounts would represent a set-off of nearly £4000 per annum. In addition to this balance of £26,000, it must be remembered that during the next two years about £12,000 would be required out of revenue for new plant and extensions at New Wortley works; £4500 was required for interest on capital; and these items did not include the needful remodelling of the York Street works, which would probably cost about £4000. This made a total of £46,500, and if they deducted from this their estimated profit of £24,000 on the year's ordinary consumption, there would be an ultimate loss of £22,500, in which it would be wrong to involve themselves. The proportionate cost of service-pipes told in favour of a certain amount of discount to large consumers, as compared with cottage property.

Alderman BUCKTON regretted not being able to agree with the committee. The difference which the proposed reduction of discounts would secure was insignificant compared with the injustice and annoyance of disturbing the allowance now made to large consumers, from whom, he argued, there was now derived a yearly profit of at least £3600, taking into consideration the comparative cost of service-pipes, &c., for their supply.

Mr. BATLEY argued that a fair consideration of the smaller consumers should induce the council to abolish all discounts.

Mr. HARLAND thought the council would act wisely in supporting the Gas Committee in their recommendation. Would it be a wise thing to go in the face of the large consumers by saying that they would place them on the same level with the small consumers? The time might come when the Gas Committee would be able to allow a small discount to all consumers, large and small, who paid within a certain time.

Alderman MASON said they were not entitled to make any profit out of their gas, but were bound to supply it as near the cost price as possible. But the existing bad system had prevailed so long, that he questioned the propriety of the amendment being carried by the council. He would vote for the resolution of the committee, and he hoped that in another year it would be seen to be sound policy to take off discount to everybody.

Alderman GAUNT did not agree either with the resolution or the amendment. At the same time he strongly deprecated a course which might lead to their losing such good customers as these large consumers, and trusted the council would not adopt Mr. Scarr's suggestion.

Mr. JACKSON said Mr. Scarr had reminded them that the council existed for the benefit of all the ratepayers, but at the same time it was very desirable that they should act in a common-sense manner in dealing with the business of the town. With such a large gas plant, the council, in the interest of the ratepayers, were not justified in trifling with the large consumers. If they did so, they ran the risk of enhancing the cost of gas to the small consumers very considerably. He should vote for the resolution.

Alderman LUPTON had always been opposed to the system of allowing discounts, and did not agree with the resolution of the Gas Committee. The question was not, in his opinion, so much one of figures as of principle.

Mr. BARKER said he would prefer that a discount should be allowed to all consumers, if they paid their accounts within a reasonable time. If they were to allow a small discount—say, of 2½ per cent.—there would be a great saving effected.

After some further conversation the amendment was put, and negatived by a large majority, and one or two additional amendments shared the same fate.

The motion was agreed to by 38 to 16.

Alderman GAUNT proposed that the price charged to the Lamp Committee for gas supplied to the public lamps in the borough be reduced from 40s. to 36s. per lamp per annum from the 1st of July next. The Lamp Committee were the largest consumers in the borough, paying £12,000 or £14,000 per annum to the corporation, and thought they were entitled to receive the benefit of any reduction that might be made in the price of gas.

Mr. BOOTHROYD seconded the motion.

Mr. WRAY said that last year every lamp cost the ratepayers £2 9s. 11d., and he trusted that the council would decide that the Lamp Committee should pay no less than £2 per lamp. If they would agree to their own proposal to pay for what gas they burnt, the Gas Committee were prepared to accept it.

Mr. SPARK moved, as an amendment, that the question be referred back to the Gas and Lamp Committees, to confer and settle the best means of ascertaining the consumption of each lamp.

Mr. HARLAND seconded the amendment, which was adopted.

Alderman GEORGE proposed that the council authorize the Gas Committee to erect new works on the land recently purchased from Mr. Wm. Longley, adjoining the present gas-works at New Wortley, and extend the main in accordance with the report of the engineer, at the estimated cost of £92,435; and that the town-clerk obtain powers from Parliament in the next session to raise additional capital. He said there could be no doubt that the works were greatly wanted, and that if they had not sufficient retorts laid down, there would be great difficulty in maintaing a proper supply of gas. He was glad to say that they had got rid of their old stock of coal. Last year they lost from £1400 to £1500 owing to possessing an old stock, because there could be no doubt the fresher the coal they obtained the more gas they manufactured. The purchase of the property would, he was sure, prove a capital investment, bought at 6s. a yard.

Mr. MOODY seconded the resolution, which was adopted unanimously.

PARIS GAS COMPANY.

At the Ordinary General Meeting of the Paris Gas Company held on the 23rd of March last, the following report of the company's operations for the year 1875 was presented by the board of direction:—

GENERAL REMARKS.

The year 1875 is distinguished from former years by an increase in the consumption of gas which has exceeded all previous experience. In fact, the amount of annual increase, which previously to that year had varied between 6 and 8 million cubic mètres, and reached 14,235,000 cubic mètres (502½ million cubic feet) in 1867—the year of the great International Exhibition—in 1875 reached 15,286,000 cubic mètres (539½ million cubic feet); and judging by the receipts during the first months of the present year, this progress seems to be tending rather to increase than to diminish.

The increase in the number of consumers, whether supplied from ordinary service-pipes or from house services, as well as the more extensive use of gas in the environs of Paris, and in the districts beyond the fortifications, does not sufficiently account for the results above stated. A notable portion of this increase must be attributed to a return, on the part of the consumers, to their original habits of lighting.

An attentive study of the various elements of consumption, of which we possess complete statistics, leaves no doubt as to the tendency of the average expenditure of gas per consumer to approach every day more nearly to the limit which it had attained in 1869.

Consumption of Gas.—During the past year there was sent out for consumption, from our various stations, ten in number, a volume of gas equal to 175,958,244 cubic mètres (or nearly 6211½ million cubic feet); being, as we have already said, 15,286,000 cubic mètres more than in 1874.

The day consumption, which takes place between the hours of six in the morning and six in the evening, figures in the above total to the extent of 33,169,095 cubic mètres (1171 million cubic feet), and exceeds by 2,809,235 cubic mètres (rather over 99 million cubic feet) the corresponding figures in 1874. This increase is the result of the development which has taken place in the various applications of heating by gas to domestic and industrial uses.

Receipts for Gas.—The product of the sale of gas has reached 43,507,287 frs. (about £1,740,291), exceeding by 3,513,984 frs. (about £140,559), or 8·8 per cent., the receipts for the year 1874. These receipts may be apportioned as follows between the districts supplied by the company:—

	Francs.
In old Paris	33,697,220
In the outer zone	7,119,442
In the environs beyond the fortifications	2,690,625
Total	43,507,287

Consumers.—The number of consumers on Dec. 31, 1875, was 111,221, and exceeded by 6542, or 6·25 per cent., the number on the same date in 1874. Of these new consumers, 4230, or nearly two-thirds, are supplied from the house services.

Public Lighting.—The number of public lights in use on the 31st of December last was as follows:—

In Paris	21,047
In the outer zone	12,589
In the environs	5,771
Total	39,407

exceeding by 909 the number in use on Dec. 31, 1874.

* *House Services.*—In this branch of the company's operations, we have continued to introduce all the improvements which experience has proved to be of value; and, inspired by the remarks made at previous meetings, have neglected nothing in order to reduce the net cost of these services, and to render their employment more productive. On this subject we shall simply leave the following figures to speak for themselves; comment thereon is unnecessary.

During the year 1875, the company laid on 121 house services at the request of the owners, who undertook to fit up at their own expense a minimum of three lights in three apartments; and 1274 at the request of lodgers, who were willing to contract at once for a consumption of at least three burners.

The number of house services laid on in the year amounted to 1395, bringing the total number of these services in use on Dec. 31 last to 7898, which represents very nearly double the number in use four years previously—viz., on Dec. 31, 1871. These 7898 services, exclusive of the fittings, taps, and meters, which are subject to a special charge, cost 4,624,314 frs. (£184,972, which is equal to an average cost of 585 frs. (£23 8s.) per service, being a trifle lower than the amount (596 frs., or £23 17s. 6d.) stated on Dec. 31, 1874.

The receipts arising from the sale of gas consumed by these services amount to 4,519,725 frs. (£180,789), which is an augmentation by 798,867 frs. (£31,954) or 21½ per cent. of the analogous receipts for the preceding year, which amounted to 3,720,858 frs., or £148,834.

The number of consumers on the house services on Dec. 31, 1874, was 18,250; at the same date last year it was 22,480, representing very nearly one-fifth of the total number of consumers.

Principal Results of Working.—The following table gives the quantity of gas manufactured from Jan. 1, 1856, to Dec. 31, 1875. It shows that during this period of 20 years the total increase has been 135,163,844 cubic mètres (4,771,283,700 cubic feet), or 331 per cent., the average annual increase having been 6,778,192 cubic mètres, or rather over 239½ million cubic feet:—

Year.	Annual Consumption. Cubic Mètres.*	Annual Increase. Cubic Mètres.
1855	40,774,400	—
1856	47,335,475	6,561,075
1857	56,042,640	8,707,165
1858	62,159,300	6,116,660
1859	67,628,116	5,468,816
1860	75,518,922	7,890,806
1861	84,230,676	8,711,754
1862	93,076,220	8,845,544
1863	100,833,258	7,757,038
1864	109,610,003	8,776,745
1865	116,171,727	6,561,724
1866	122,334,605	6,162,878
1867	136,569,762	14,235,157
1868	138,797,811	2,228,049
1869	145,199,424	6,401,613
1870	114,476,909	30,722,520 decrease
1871	87,481,346	26,995,558 „
1872	147,668,331	60,186,985
1873	154,397,118	6,728,787
1874	160,652,202	6,255,084
1875	175,938,244	15,286,042

Manufacturing Power.—The distillation plant upon the company's works on the 31st of December last represented a manufacturing power of 882,000 cubic mètres (31,135,000 cubic feet), exceeding by about 10 per cent. the estimated maximum requirements. This surplus, which forms a reserve in case of accident or any unforeseen increase in consumption, has this year been of very great service, by enabling the company to provide for an augmentation of consumption equal to double that of preceding years. This circumstance has again proved to us that the proportion of 10 per cent. adopted for the reserve is absolutely indispensable, and cannot be reduced without compromising the safety of the service.

Mains.—During the year 1875 important main-laying operations were carried out, for the purpose of bringing more directly to the centre of Paris the gas made at the company's stations at La Villette and Vaugirard. Thanks to this development of our means of supply, the hourly consumption has been brought up to 112,000 cubic mètres (about 4 million cubic feet), which corresponds to a delivery of 1866 cubic mètres (about 66,000 cubic feet) per minute. These additional main-pipes, added to those of smaller dimensions laid in a number of places, in order to extend or improve the distribution of gas, have increased our total length of mains by 47,427 mètres, or about 52,000 yards, apportioned as follows:—

In Paris	9,724 mètres.
In the outer zone	22,771 „
In the environs	14,932 „
Total	47,427 mètres.

The total length of gas-mains laid under the public roadways on the 31st of December last was consequently increased to 1,675,471 mètres, or about 1,826,260 yards (about 1034 miles), apportioned as follows:—

In Paris	693,839 mètres.
In the outer zone	513,431 „
In the environs	468,201 „
Total	1,675,471 mètres.

The greater portion of the main-laying work has been undertaken, as usual, either upon the requisition of the municipal service, or in the execution of our contracts with the communes of the districts beyond the fortifications; also at the request of private persons, whose consumption ensured us a sufficient return for our outlay.

FIRST ESTABLISHMENT CHARGES.

One of the greatest difficulties to be encountered in supplying gas to a city like Paris is the considerable diversity which often occurs in the winter in the quantity consumed on several consecutive days. A dull day following a bright one, or *vice versâ*, causes an increase or decrease of from 50,000 to 60,000 cubic mètres (1,765,000 to 2,118,000 cubic feet) in the consumption in the course of 24 hours, and as the manufacture of the gas goes on regularly, it is necessary that the gasholders should always be in a condition to meet the increased demands, or to hold in store the surplus gas produced.

The difficulties attending these irregularities necessarily increase with the importance of the supply; they become complicated at the changes of season or by a variation in consumption on the same day; it will therefore be seen that active measures and a more powerful manufacturing plant than would be required for a normal and regular consumption of gas are absolutely necessary. We have, therefore, not hesitated, in presence of the enormous increase in consumption that has taken place since the first months of the year 1875, to raise the storeage capacity of our works from 420,000 to 473,000 cubic mètres (15 to 16½ million cubic feet), by constructing at our stations at La Villette, Vaugirard, and Boulogne, four additional gasholders, having a total capacity of 53,000 cubic mètres, or nearly two million cubic feet.

The other works executed at our various stations were undertaken with the view of perfecting our distillation apparatus, and placing our condensing and purifying plant, our coal stores, and our machinery for the treatment of the coke, tar, and chemical products, on a footing with the manufacturing power of our retorts.

We estimate that, by the end of 1876, our works will have attained all the development of which they are capable, and in order to ensure an adequate supply of gas during the winter of 1877, an additional station will have to be erected on a portion of the land possessed by the company outside Paris.

It is in view of the urgency of the extension works required to be done during the present year, and especially the enlargement of the Ivry station, the annual manufacturing power of which should be raised from 10 to 25 million cubic mètres (353 to 882½ million cubic feet), that we have acquired the several properties specified in the following account, which shows in detail the manner in which the total amount (6,316,223 frs.) expended during the year under the head of "First Establishment Charges" has been disposed of:—

* These house services, called *conduits montants*, are pipes carried from the bottom to the top of a building, for the supply of flats and separate apartments, as in Scotland.

* A cubic mètre equals 35·317 cubic feet.

Account of First Establishment Charges for the Year 1875.

Expended in the Purchase of Land, &c.

	Francs.
Property acquired for the erection of a gasholder of 20,000 cubic mètres capacity at Les Ternes station	40,000
Ditto to meet the requirements of the St. Mandé station	18,600
Ditto for extension of coal store at the Vaugirard station	12,000
Ditto for extension of the Ivry station	261,344
Law and sundry charges	57,204
Total	389,148

Expended on Works and Plant.

La Villette.—Construction of three tanks and two gasholders, with inlet and outlet pipes, mains, boundary walls, &c., and steam generators	1,172,089
Les Ternes.—Condensers, alteration of the hydraulic main for three settings of retorts, main-laying	207,342
Passy.—Erection of a second coke-pounding machine, completion of stable, fixing two cranes for unloading coals	37,640
Vaugirard.—Construction of a gasholder of 15,000 cubic mètres capacity, inlet and outlet pipes	416,786
Ivry.—New purifying-house, 24 purifiers, drying-shed, water reservoir; commencement of two gasholders, each of 20,000 cubic mètres capacity	159,833
Belleville.—Extension of purifying apparatus, erection of engine for coke-pounding purposes	28,984
St. Mandé.—Completion of retort-houses Nos. 5 and 6, repair of guide-framing of gasholder No. 5, two sets of condensing-pipes	112,926
Boulogne.—Construction of a gasholder of 8000 cubic mètres capacity, inlet and outlet pipes, boundary walls, &c.	187,975
Maisons Alfort.—Construction of a half setting of three double retort-ovens, main-laying and paving	43,027
Tar Works.—Six new coppers for the distillation of tar, two steam generators of 50-horse power, apparatus for the treatment of secondary products, paving work, &c.	194,419
Compressed Fuel.—Completion of a breeze-compressing machine and mechanism for conveying the products from the workshop	29,051
Works for Chemical Products.—Two new coppers at St. Mandé for the distillation of ammoniacal liquor; wells, pumps, and reservoirs	48,422
Machine Works.—Removal of the workshop from the Ivry station to Clichy; re-erection and extension of machinery, &c.; paving work	75,215
Sundry erections at the other stations of the company	27,053
Total	3,139,911
Main-Laying.—New mains laid during the year, replacing old mains by others of larger diameter	1,091,441
House Services.—Expenses incurred in laying on, &c.	746,439
Fittings.—Manufacture of fittings let out on hire	403,192
Meters.—Purchase of meters let out on hire	413,575
Vehicles.—Increase in number of horses and vehicles	53,783
Tools and Materials.—General increase in stock	270,239
Establishment Charges.—Miscellaneous payments	207,643
Total	6,316,223
In sterling	£252,649

The general position of the account of first establishment charges may be thus stated:—

	Francs.	Francs.
Amount expended to Dec. 31, 1874		146,695,069
Ditto during 1875		6,316,223
Total on Dec. 31, 1875		153,011,292
To meet which there is a capital of—		
In shares	84,000,000	
In bonds	85,145,739	
		169,145,739
Balance in company's favour		16,134,447
On which there remains to be received on bonds of the last issue		15,781,400
Difference		353,047
In sterling		£14,122

Loan.—The works to be carried out by means of the loan of 25,226,000 frs. (about £1,009,000 sterling), authorized by the shareholders for the purpose of increasing by 40 million cubic mètres the annual manufacturing power of the works, and to liquidate the first establishment charges outstanding on Dec. 31, 1874, were estimated at the sum of 23,216,000 frs. (£928,640), divided as follows:—

	Francs.
Purchase of land and construction of works	12,716,000
Main-laying	3,260,000
House services, meters, tools, &c.	7,240,000
Total	23,216,000

Out of this sum, the expenses actually incurred during the year 1875 amounted, as shown above, to 6,316,223 frs., divided as follows:—

Purchase of land and construction of works	3,337,554
Main-laying	1,091,441
House services	1,887,228
Total	6,316,223

Consequently, on Dec. 31 last, there remained to be expended—

On land and works	9,378,446
On main-laying	2,168,559
On house services, &c.	5,352,771
Total	16,899,776
In sterling	£675,991

The first establishment charges appertaining to the year 1875 slightly exceeded our anticipations. This arose from our having to meet an increase in consumption double that of preceding years. It is probable that it will be the same in 1876, because we shall not only have to provide for the additional increase in consumption, which, to all appearance, will not be below that of last year, but also to keep up our reserve plant, the stock of which on Dec. 31 last did not reach the tenth part of that of the plant in operation.

Working Account for the Year 1875.

Expenditure.

	Francs.	Sterling.
Value of gas in store on Jan. 1, 1875	12,801	£512
Materials used in Manufacture.		
Coals carbonized	16,334,037	£653,362
Coke and tar for heating purposes	3,145,109	125,804
	19,479,146	£779,166
Manufacturing Charges.		
Salaries and wages	1,794,705	£71,788
Maintenance of works and plant	1,207,514	48,300
Incidental expenses of distillation	937,203	37,488
Purifying material	222,931	8,918
General expenses	61,299	2,452
	4,223,652	£168,946
Cost of Distribution.		
Salaries of engineers and officers	857,611	£34,305
Repair and maintenance of mains and service-pipes	365,792	14,632
Allowances, premiums, &c.	15,987	639
Printing and advertising	117,496	4,699
Miscellaneous	45,969	1,839
	1,402,855	£56,114
General Management.		
Board of direction	80,000	£3,200
Executive committee	70,000	2,800
Salaries	663,062	26,523
Office and other expenses	128,623	5,145
Service, accidents, relief, &c.	124,676	4,987
Law and other charges	19,330	774
Rents and insurances	77,946	2,918
Interest on loans	3,958,215	158,328
Loan redemption-fund	998,000	39,920
Share ditto	1,143,250	45,730
Cost of experiments, &c.	53,119	2,124
Pension-fund	85,500	3,420
Provident-fund	85,740	3,429
	7,487,461	£299,498
Municipal Charges.		
Tax of ·02 c. per cubic mètre of gas	3,001,770	£120,070
Rating of subsoil	200,000	8,000
Lighting, extinguishing, and maintenance of public lamps	337,133	13,486
	3,538,903	£141,556
State Charges.		
Taxes	385,280	15,411
Subsidy to Control Department	8,000	320
Stamps	101,483	4,059
	494,763	£19,790
Total expenditure	36,679,584	£1,467,184

Revenue.

	Francs.	Sterling.
Produce of the sale of gas	43,507,287	£1,740,291
Value of gas in store on Jan. 1, 1876	10,757	430
Retort coke	14,098,434	563,937
Furnace coke	678,813	27,153
Tar	2,501,664	100,067
Ammoniacal liquor	299,970	11,999
Rent of meters	946,413	37,857
Ditto of fittings, &c.	878,937	35,158
Fire-bricks	196,084	7,843
Chemical products	844,956	33,798
Sundry works	94,832	3,793
Interests and discounts	1,063,860	42,554
Total revenue	65,122,007	£2,604,880
Balance in favour of revenue, being profit made during 1875	28,442,423	£1,137,696
Add balance of profit from 1874	97,576	3 903
	28,539,999	£1,141,599
Deduct reserve to meet claims outstanding on Dec. 31, 1875	139,999	5,599
Balance, being profits available for distribution	28,400,000	£1,136,000
Deduct for share dividend	12,400,000	496,000
Balance, divisible equally between the Corporation of Paris and the Gas Company	16,000,000	£640,000

The total amount available for distribution among the shareholders is, therefore, as follows:—

	Francs.	Sterling.
Dividend, as per above account	12,400,000	496,000
Moiety of balance, ditto	8,000,000	320,000
Third payment by the city on account of loan	50,000	2,000
Balance of profit from 1874	135,530	5,421
Total	20,585,530	£823,421
Deduct 1 franc per share for special reserve-fund, authorized at the general meeting on March 23, 1875	336,000	13,440
Balance	20,249,530	£809,981
Deduct first dividend of 12 frs. 50 c. paid in October last	4,044,363	£161,774
	16,205,167	£648,207
Deduct final dividend of 47 frs. 50 c., making a total dividend for the year of 60 frs. per share (500 frs.)	15,960,000	£638,400
Net balance to carry forward	245,167	£9,807

PROVIDENT AND OTHER FUNDS.

Provident-Fund.—During the year 1875, the medical staff visited, at their homes, 1423 of the company's servants, and had 15,049 consultations. The medical fees, medicine, baths and instruments, half salaries and funeral expenses, caused an expenditure of 205,355 frs. (£8214). The account of this fund stands as follows:—

EXPENDITURE.

	Francs.
Medical fees, medicine, &c., as above.	205,355

RECEIPTS.

One per cent. deducted from salaries, &c.	85,740
Equal amount given by the company	85,740
Interest	8,012
	179,492
Excess of expenditure.	25,863

This increase in expenditure is altogether abnormal, and results principally from the payment of half salaries to workmen absent on account of sickness, the company's working staff having been more severely tried at the commencement of the past, than in preceding years.

On the 31st of December last the fund possessed 157 fully-paid bonds of the company; and it was indebted to the company in a sum of 26,000 frs., which had been temporarily advanced to avoid the sale of a portion of the securities belonging to the fund.

Pension-Fund.—On the 31st of December last this fund possessed 1894 fully-paid bonds of the company, 1190 bonds of the last issue, upon which 200 frs. only had been paid, and a balance in cash of 41,700 frs. The disposable balance, augmented by the interest due on the 1st of January last, and the payment for the first half of 1876, will be employed in paying off the third instalment of the 1190 new bonds. Consequently, the annual revenue of this fund on the 1st of July next will amount to 63,244 frs., or about £2530 sterling.

The previous appropriation of 45,000 frs. made each year from the amount placed to the credit of this fund, for the purpose of assisting those of the company's servants who have become incapable of performing their duties, and who have no claim upon the fund, has been found to be insufficient. We have, therefore, added to it a subsidy of 49,644 frs., of which 15,000 frs. are for pensions, and 38,854 frs. are for assistance, renewable every year. Last year this subsidy amounted to 44,230 frs.

Special Reserve-Fund.—This fund, the formation of which was authorized by the shareholders at the last meeting, is now working regularly. It was founded with the object of securing to the completed shares, at the end of the concession, a capital of equal value to the share which the City of Paris will then take of the company's assets. The unanimity of the vote with which this provident measure was received, proved that its importance was appreciated, and that the influence it was called to exercise upon the future value of our securities was fully estimated. This reserve-fund held, on the 31st of December last, 2327 bonds of the last issue, paid upon to the extent of 200 frs., representing a value of 465,000 frs. (£18,600), and a cash balance of 336,156 frs. (£13,446). This latter sum will be applied to the payment of the third instalment on the bonds falling due on the 6th of April, and to the purchase of other securities of the company.

LABOUR, MATERIALS, RESIDUALS, &C.

Labour.—During the year 1875 there was but a very slight increase in the number of workmen at the several stations of the company, and we have invariably had to congratulate ourselves on the amount of work performed by our staff of operatives, and the good will they have evinced towards us.

Coal.—For the past twelve months the price of coal has varied but little; nevertheless we have been able to renew, on relatively advantageous terms, those of our contracts which were drawing to a close. We need scarcely tell you with what attention we follow the market price of a raw material which forms so important an item in our working expenses.

Coke.—The employment of coke for domestic purposes continues to become more general, notwithstanding the extent to which, for some time past, heating by gas has been adopted. Although in 1875 we produced 980,140 hectolitres (2,695,385 bushels) more than in the preceding year, the stock on hand on the 31st of December last exceeded by 28,384 hectolitres (78,056 bushels) only the quantity in store at the same date in 1874. As we remarked in our last report, these two modes of heating, by gas and by coke, appear to be attaining perfection without clashing one with the other.

The produce from the sale of coke, which in 1874 amounted to 12,744,854 frs. reached the sum of 14,098,434 frs. in 1875. The amount produced by the sale of metallurgic coke was 678,812 frs., exceeding by 102,892 frs., the sum received for this product in the preceding year. The receipts for coke alone were therefore increased by more than 1,450,000 frs. (£58,000.)

Heating Apparatus.—The number of apparatus for heating by coke that were sold during 1875 reached 2633, bringing the total number of these apparatus which have left the company's works up to the present time, and are now in action in Paris, to 40,731. These apparatus, which we sell at the lowest possible price, are constructed with particular care, and they have greatly contributed to ensure the sale of our coke.

Tar and Chemical Products.—All the products resulting from the treatment of our tar and ammoniacal liquor are in greater request, and enjoy upon the market a reputation which renders their disposal easy and advantageous.

During the year 1875 we received for tar 2,501,664 frs.; chemical products, 844,956 frs.; making a total of 3,346,620 frs. (£133,865). These figures are higher than those for the preceding years, which were as follows:—For 1872, 1,657,843 frs.; for 1873, 2,230,113 frs.; for 1874, 2,638,858 frs. This increase in 1875 is especially due to the extension that has been given to the manufacture of a new product known as *anthracene*—an article used in the manufacture of artificial alizarine.

Gas-Engines.—The development of this portion of the company's operations has not progressed so rapidly as we had hoped. In the course of the past year, however, we sold nine horizontal engines on Lenoir's system, and 35 vertical engines on that of Otto and Langen, representing altogether a motive force equal to 48¾-horse power. The engines on the latter system, which, unlike those on Lenoir's plan, do not require the use of electricity, seem destined to be rather extensively employed. The number of gas-engines in use in Paris on the 31st of December last was 201, the quantity of gas consumed by which may be pretty closely estimated at 707,500 cubic mètres, or about 25 million cubic feet.

Compressed Fuel.—In our most recent reports we informed you that, having been unable to find a sale for considerable quantities of breeze, with which all our stations were encumbered, we had decided upon converting this residual, by means of compression, into a combustible fuel, to be used in place of coke for heating the boilers and ovens.

During the year 1875 we manufactured 15,444 tons of compressed fuel, the employment of which upon our works enabled us to offer for sale, instead of using it for heating the ovens, about 380,000 hectolitres (1,045,000 bushels) of coke, which returned us a profit of 93,000 frs. (£3720).

This manufacture very satisfactorily completes the entire series of processes employed by the company for utilizing their residuals, and we are now able to affirm that the whole of the coal received into our works leaves them in the shape of merchantable products, without loss or waste.

DEVELOPMENT OF THE CHEMICAL ARTS DURING THE LAST TEN YEARS.*

Extracts from a Report by Professor A. W. HOFMANN.

[Translated and published in the *Chemical News*.]

Of the three properties to which the industrial applications of hydrogen are applicable, two are of so striking a nature that they cannot have escaped the earliest observers. To them it appeared as the combustible principle, the "volatile sulphur;"† subsequently, it was regarded as the long sought-for phlogiston,‡ or as the "inflammable air," of which all combustible gases were mere varieties. In modern times this previously vague knowledge has been rendered definite, recognizing in hydrogen the greatest heat of combustion, and consequently the property of producing the highest degrees of heat and light, properties which met with a practical application at an early date.

The low specific gravity of hydrogen did not escape the earliest observers. Being scarcely ponderable, it excited the idea of imponderable bodies, and its specific lightness, as well as its great heat of combustion, soon met with a striking application.

A third attribute is of a less manifest nature. Occasionally destroying colours, but often obtained without any brilliant and striking phenomena, hydrogen in its nascent state is capable of entering into many combinations, of which it is incapable when pre-existing in a free state. It liberates chlorine, oxygen, and other elements from their compounds, and takes their place; or it is deposited in compounds not fully saturated, and fills up the vacancies. This attribute is most weighty for the most recent development of chemistry, as well as of great technological importance. Unawares, this property has been made use of for ages. Upon it depends the transmutation of indigo blue in the vat into indigo white, and, consequently, one of the oldest and most important branches of the art of dyeing.

In 1842, Zinin succeeded in converting nitrobenzol into aniline by the action of nascent hydrogen, and thus opened out an industrial region of unimagined extent. The era of the artificial dyes followed. It was soon perceived that many of these substances shared with indigotin the property of being decolourized by hydrogen, and thus zinc powder was introduced into calico printing as a discharging agent, which, developing hydrogen in patterns where it is printed on, removes artificial colouring matters—*e.g.*, magenta §

A series of interesting observations showed, however, that the manner in which hydrogen is evolved is not without influence on hydrogenization. Whilst ammonium sulphide, and whilst acids under the influence of metals give up so much hydrogen to nitrobenzol as to form aniline, if other sources of hydrogen are employed, the reaction is arrested half way, and intermediate products are generated. Herewith, therefore, nascent hydrogen escapes from our general consideration, and its technical application will be described in future parts of this report.

We return, therefore, to its applications as a source of heat and light. It has been briefly described in the section on oxygen how the oxyhydrogen blast was evolved from the experiments of Saron between 1780 to 1790, and how it was introduced in the manufacture of platinum in the middle of the present century by Deville and Debray. Since 1838,‖ Desbassains de Richemont found in hydrogen mixed with air the means for the autogenous soldering of sheets of lead, and thus supplied the sulphuric acid manufacture with the fundamental condition of its growth—*i.e.*, permanent lead chambers of any desired magnitude. If in places where coal gas is readily procurable, this combustible is substituted for hydrogen in soldering lead; many sulphuric acid chambers are not near gas-works, and in them hydrogen is still necessary for soldering. The same must be said on the application of hydrogen for the autogenous soldering of other metals and alloys, a process for which Winckler, in his convincing essay already quoted, predicts a great future. More recently, lead pans soldered in this manner have been introduced in the manufacture of boracic acid in Italy. Numerous conflagrations, especially that of Canterbury Cathedral in 1871, and that of the Alexandra Palace, on Muswell Hill, in 1873, demonstrably due to the braziers full of fire used in soldering the leaden spouts, have led, in England, to the proposal to solder leaden roofing and spouting with hydrogen.

How far hydrogen is superior to other kinds of fuel appears from the following table. According to the experiments of Favre and Silbermann, 1 gramme of the following bodies, when burnt in water, gave the appended number of calories—i.e., it raised by 1° the temperature of the given number of centigrammes of water:—

Hydrogen	84·462
Carbonic oxide	2·403
Oil of turpentine	10·852
Stearic acid	9·716
Alcohol	7·814
Marsh gas	13·063
Wood charcoal (burnt to carbonic acid)	8·080
Ethylen	11·858
Ether	9·028

The temperature of the flame does not, however, depend exclusively on the heat of combustion. The density of the burning body and the specific heat of the products of combustion must also be taken into account. Hence it comes that the temperature of the hydrogen flame in pure oxygen is about 6800°, in air about 2600°; the temperature of the flame of carbonic oxide in oxygen amounts to 7000°, in air about 3000°;** further, according to calculation, 1 vol. of hydrogen = 1 grm. is capable of fusing 205 grms. of platinum, whilst the same volume of carbonic oxide can fuse 238 grms. of platinum (melting point 2000°). In practice, however, even under the most favourable conditions, as Deville and Debray determined in their researches on platinum, about half the heat is lost by conduction to the furnace and other surrounding matter; and the above authorities, with 120 litres of hydrogen and 60 of oxygen, succeeded in fusing only 1 kilo. of platinum, instead of double the amount, as calculated. Platinum can also be smelted and refined under similar circumstances with coal gas. But for the more infusible metals of the platinum group, iridium, ruthenium, and their alloys, the hydrogen flame must be retained, which, if costlier than coal gas, is cheaper than carbonic oxide.

In the use of gases as fuel, the metal itself can be brought in contact with the flame, which is impracticable in case of carbon, and thus the great loss of heat is avoided which ensues when the crucible is heated from without. Their application renders it also possible to inspect the condition of the metal at any moment. In the metallurgy of the common metals these two advantages do not come into consideration. Carbon, moreover, is not only the cheapest, but the most productive fuel,†† and the application of hydrogen as a source of heat seems, therefore, limited to autogenous soldering, and to the fusion of the most refractory platinum metals.

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* "Berichte über die Entwickelung der Chemischen Industrie Wahrend des Letzten Jahrzehends."

† Lemery, "Mémoires de l'Académie," 1700.

‡ Cavendish, 1766.

§ The transformation of the coloured salts of rosanilin into the colourless salts of leucanilin by means of zinc and hydrochloric acid was discovered by A. W. Hofmann in 1860.—*Proc. Roy. Soc.*, vol. xii., p. 2. The above application is due to Durand. *See* Schützenberger, "Traité des Matières Colorantes," vol. i., p. 491.

‖ Karmarsch "Geschichte der Technologie," 380.

** Debray, "Sur la Production des Températures Elevées et sur la Fusion de la Platine." Leçons de Chimie en 1861, 65; Paris, 1862.

†† The calculated temperature of the flame of carbon in oxygen is 10,000°, from which has to be deducted the unknown amount of heat, which, at this temperature, is lost by dissociation. See Debray, *opus citat.*

The property of platinum black to ignite hydrogen, of which Döbereiner made a well-known and widely utilized application in his hydrogen lamp in 1823, has lost its practical importance, owing to the discovery of friction matches.

The more intense and permanent was the interest which hydrogen created as a source of light.

As the luminous power depends on the temperature at which a solid ignited body is maintained, the suggestion was near at hand to produce an intense light by means of this gas, in which an incombustible body was heated to whiteness. To this end the Scotch military engineer, Drummond, used in 1826 cylinders of caustic lime, heated in the oxyhydrogen flame. The Drummond light has been widely employed, not merely in geodetic measurements and in lighthouses, which the inventor had principally in view, but also for projections of microscopic objects and photographic images on glass, or drawings upon gelatine for demonstration in lecture halls,* for dissolving views and chromatropes. In the American Civil War it was used in sieges to light up forts. † The English War Department has tried it in barracks, in large halls and courts, in which ‡ it is said to have proved cheaper than coal gas, whilst the smallest characters could be read at a distance of 90 mètres from the source of light.

Since lime partially loses its luminous power by continued use, platinum wire, magnesia, and latterly zirconia, have been employed in its stead. §

The above-mentioned application of the hydrogen lamp are, however, of a very limited nature. To utilize it on the large scale for street-lighting, the simultaneous use of oxygen has been laid aside, and cheaper methods of preparation have been sought for. For this purpose advantage was taken of Felice Fontana's method of decomposing water by means of ignited iron and ignited carbon, as proposed in 1780. ‖ On the latter scheme Donovan founded his industrial preparation of hydrogen gas in Dublin in 1830. His process has been repeatedly described, with modifications, referring in part to the needful apparatus, and in part to the diminution of the proportion of carbonic oxide. The presence of this poisonous gas was at first justly urged as an argument against the use of the "water gas." Langlois found that the mixture obtained—on allowing steam to pass over iron retorts filled with red-hot coke in Kirkham's apparatus—had the tolerably constant composition of 58 to 60 per cent. of hydrogen, 19 to 26 carbonic oxide, and 15 to 20 carbonic acid.

It was subsequently, however, discovered ¶ that at higher temperatures carbonic oxide is oxidized by watery vapour to carbonic acid, so that, if the steam is in excess, a gas may be obtained relatively free from carbonic oxide, as shown in the reaction—

$$C + 2H_2O = 4H + CO_2.$$

In the water gas prepared at Narbonne, where the gas, on issuing from the retorts, is conducted through ignited tubes along with fresh quantities of superheated steam, Verver ** found, in 1858, 3·54 per cent. of carbonic oxide. According to other observers, the amount ranged from 2·5 to 5 per cent. In the water gas at Passy, Payen found 6 per cent. of carbonic oxide, whilst in ordinary coal gas he found an average of no less than 14 per cent. The above-mentioned objection, therefore, no longer holds good.

The carbonic acid is removed by milk of lime, or perhaps, more economically, according to the suggestion of Heurtebise,†† by soda, which is thereby converted into bicarbonate, a readily saleable substance.

Fayes ‡‡ constructed for lighting the town of Narbonne an apparatus which he named gazogen, which furnished in 24 hours 1000 to 1200 cubic mètres of purified gas, the cost of which, independent of labour, and of the cost and depreciation of plant, he calculates as follows:—

Per 100 *Cubic Mètres of Gas.*

75 kilomètres of	coke at 0·03 franc	2f.	25c.
55 ,,	coal at 0·025 ,, ...	1	37
82 ,,	lime	0	82
		4	44

The material costs, therefore, 4½ centimes per cubic mètre.

Instead of decomposing water by carbon, certain other processes have recently come into use, and require notice.

Lenoir's process, §§ suggested in 1867, is of very limited applicability. He decomposed barium sulphide with water, obtaining sulphate of baryta and hydrogen—

$$BaS + 4H_2O = BaSO_4 + 4H_2.$$

This process is only practicable where the manufacture of barium sulphate (permanent white) is the main object, and the hydrogen a by-product, as was the case with Lenoir.

Tessié du Motay and Maréchal ‖‖ have introduced a valuable modification into practice, as they require no steam-boiler for the manufacture of the water gas, and thus economize fuel, whilst the wear of the simplified apparatus is considerably reduced. They heat coal with soda, hydrate of lime or of baryta in iron retorts, and thus decompose the combined water of these bases, which is then freed from carbonic acid in the ordinary manner. This procedure has been adopted by the New York Oxygen Company, who, in the manner described above, sell water gas at the enormous price of 2 cents per cubic foot, or 1 cubic mètre for 3s. 6d. ¶ ¶ The mixture of lime and anthracite is heated in retorts such as those described above under Tessié du Motay's method of preparing oxygen. The decomposition takes place at a red heat, according to the equation—

$$C + CaO + CH_2O = CaCO_3 + 2H_2,$$

and lasts about 15 minutes. Thereupon hydrate of lime is re-formed by passing steam over the heated mass. The carbon is not exhausted until after three weeks, and is then replaced by a fresh supply of anthracite.

That coal gas contains large quantities (30 to 50 per cent.) of free hydrogen, and that the proportion of this ingredient rises, the higher the temperature of the retorts in preparing the gas, has long been known. Tessié du Motay and Maréchal, whilst introducing the above described procedure, have taken advantage of this circumstance, and have passed coal-gas over lime in order to resolve it into carbon, hydrocarbons boiling at high temperatures, and large quantities of hydrogen. At the same time E. Vial *** adopted the same method, and has doubled, and even trebled, the yield of gas by "decarburation." Schinz ††† doubts the industrial value of this process, on account of the outlay for fuel, and calculates that the decomposition of water by means of coal yields a luminous gas for half the cost of coal gas. Here, however, as we shall presently see, the depreciation of the plant has not been taken into account.

(*To be continued.*)

* This Report, p. 14; also H. Vogel, *Ber. d. Chem. Gesell.*, iii., 901.
† Wagner, "Lehrbuch der Technologie." 9th edit., ii., p. 377.
‡ Journal of Gas Lighting, 1869.
§ See the work of Phillips, quoted above.
‖ *Mem. Soc. Ital.*, xv.
¶ Bromeis, *Zeitsch. d. Ver. deutsch. Ing.*, iii., 82, and *Dingler Pol. J.*, clxiv., 33, 1859.
** B. Verver, "L'Eclairage au Gaz à l'Eau à Narbonne et l'Eclairage au Gaz Leprince." Leiden, 1858. See Bromeis, *opus citat.*
†† Heurtebise, *Dingl. Pol. J.*, cxxcvi. (?), 333, 1867.
‡‡ Fayes, *Génie industriel*, 1868, 329. *Dingl. Pol. J.*, clix. 47.
§§ Lenoir, *Wagn. Jahresber.*, 1867, 219, 259.
‖‖ *Bull. Soc. Chim.*, 1868, i., 334.
¶¶ H. Vogel, *Ber. Chem. Ges.*, iii., 901.
*** Vial, *Génie Industriel*, 1869. *Dingl. Pol. J.*, cii., 382.
††† Schinz, *Dingl. Pol. J.*, cii., 388.

HEALTH AND SEWAGE OF TOWNS.

Report on the Results of the Recent Conference at the Society of Arts.

The following report has just been issued:—

The Chairman of the Conference and the Executive Committee, after having carefully considered the information furnished from the various localities, as well as the facts brought forward during the conference, have to submit the following as the conclusions to which such information appears to lead:—

1. In certain localities, where land at a reasonable price can be procured, with favourable natural gradients, with soil of a suitable quality, and in sufficient quantity, a sewage farm, if properly conducted, is apparently the best method of disposing of water-carried sewage. It is essential, however, to bear in mind that a profit should not be looked for by the locality establishing the sewage farm, and only a moderate one by the farmer.

2. With regard to the various processes based upon subsidence, precipitation, or filtration, it is evident that by some of them a sufficiently purified effluent can be produced for discharge, without injurious result, into water-courses and rivers of sufficient magnitude for its considerable dilution; and that for many towns, where land is not readily obtained at a moderate price, those particular processes afford the most suitable means of disposing of water-carried sewage. It appears, further, that the sludge in a manurial point of view is of low and uncertain commercial value; that the cost of its conversion into a valuable manure will preclude the attainment of any adequate return on the outlay and working expenses connected therewith; and that means must, therefore, be used for getting rid of it without reference to possible profit.

3. In towns where a water-carried system is employed, a rapid flow, thorough ventilation, a proper connexion of the house drains and pipes with the sewers, and their arrangement and maintenance in an efficient condition, are absolutely essential as regards health; hitherto, sufficient precautions have rarely been taken for efficiently ensuring all the foregoing conditions.

4. With regard to the various dry systems, where collection at short intervals is properly carried out, the result appears to be satisfactory, but no really profitable application of any one of them appears as yet to have been accomplished.

5. The old midden or privy system, in populous districts, should be discontinued, and prohibited by law.

6. Sufficient information was not brought forward at the conference to enable the committee to express an opinion in regard to any of the foreign systems.

7. It was conclusively shown that no one system for disposing of sewage could be adopted for universal use; that different localities require different methods, to suit their special peculiarities, and also that, as a rule, no profit can be derived at present from sewage utilization.

8. For health's sake, without consideration of commercial profit, sewage and excreta must be got rid of at any cost.

The Executive Committee, whilst abstaining from submitting any extensive measures, have no hesitation in recommending that the prevention of dangerous effects from sewage gases should receive the immediate attention of the Legislature, and they submit the following resolutions as the basis of petitions to Parliament:—

1. That the protection of public health from typhoid and other diseases, demands that an amending Act of Parliament be passed, as soon as possible, to secure that all house drains connected with public sewers in the Metropolis, and towns having an urban authority, should be placed under the inspection and control of local sanitary authorities, who shall be bound to see to the effective construction and due maintenance of all such house drains, pipes, and connexions. Provisions having this object in view already exist in the Act constituting the Commissioners of Sewers in the City of London, in the Metropolis Local Management Act, 1855, and in the Public Health Act, 1875, but practically they seem scarcely sufficient for the purpose.

2. That plans of such drains and connexions be deposited in the charge of the respective local authorities, who shall be bound to exhibit them and supply copies of them to the public on payment of a moderate fee.

3. That the owners of houses be compelled by law to send to the respective local authorities, within a specified time after the passing of the Act, plans of all house drains on an appointed scale.

Signed by

The Right Hon. James Stansfeld, M.P., Chairman of the Conference.

Members of the Executive Committee.
- Lord Alfred S. Churchill, Chairman of the Council.
- F. A. Abel, F.R.S., President of the Chemical Society.
- Sir Henry Cole, K.C.B.
- Captain Douglas Galton, R.E., C.B., F.R.S.
- Lieut.-Colonel E. F. Du Cane, R.E., C.B., Surveyor-General of Prisons.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(from our own correspondent.)

Owing to the fact that the men at almost the whole of the South Yorkshire and Derbyshire collieries have been working all the past week, coal has become much more plentiful, and there is beginning to be a sharper competition amongst the colliery owners and coal merchants for such few orders as are in the open market. Quotations are coming down very rapidly, and are likely, judging from present appearances, to fall lower this summer than they have been since the time which was anterior to the memorable coal famine. The new price list of a leading local company, issued on Saturday, the 17th, gives the following figures:—Picked brand, 13s. 6d.; best Birley Silkstone, 10s. 6d.; best picked coal, 10s. 10d.; cubes for London, 10s. 10d.; screened Silkstone nuts, 6s.; screened seconds coal, 7s.; coke breeze, 10s.; hard (unwashed) melting coke, 18s.; and unscreened slack, 3s.; all per ton of 21 cwt. at the pits, a few miles from Sheffield. The prices offered by other local coalowners are lower than the above, but no general average can be given, owing to the great variety of the coal offered for sale from different pits. I hear that hard coal for "loco" railway purposes is being obtained by some of the great companies at exceedingly low figures, as low as 6s. to 7s. per ton being mentioned to me as the contract price in one notable instance. Some few of the collieries in South Yorkshire are experiencing a fairly good demand for steam coal for shipment from the port of Goole, Hull, or Grimsby, most of our best customers being supplied thence. There is a good deal of competition, which has the effect of cutting down prices very strictly. The Kiveston Park Collieries in North Notts, between Sheffield and Worksop, do a good business with Grimsby, a very large proportion of Mr. Josse's coal being obtained thence. I have heard nothing definite as to the proposal which I alluded to some time ago, for making Keadby a principal shipping port for South Yorkshire coal, instead of Grimsby or Hull; but I believe the chief officials of the Manchester, Sheffield, and Lincolnshire Railway Company have been over the place, and have taken the question into consideration. The scheme finds much favour with a section of the local coalowners.

In the iron trade there has been so little change—in fact, such an altogether unbroken depression, that it is really impossible to record any new facts of interest in connexion with it. Pig iron is weak, and, in sympathy with the other markets of the country, has a decided tendency to fall in price.

THE LANCASHIRE COAL AND IRON TRADES.

(from our own correspondent.)

There appears to be a very great deal of difficulty in settling with regard to the gas coal contracts which are in the market. I understand that some of the

gas companies are carefully testing various samples of coal, and it is probable that not a few of the contracts will change hands this season. Further delay in coming to terms is caused by the uncertainty with regard to prices, and, in one or two cases, buyers, it would seem, are so certain that more favourable terms can be obtained than those now offered, that they are asking for "revised" tenders. Amongst sellers there is a very keen competition, and although the average quotations for good screened gas coal at the pit mouth in the Wigan district are about 10s. to 11s. per ton, there are offers at very low prices. When, however, one or two of the large gas companies have closed their contracts, some definite guide will be afforded as to actual values.

In other classes of coal the market is very dull. For round coal there is very little demand either for home consumption or shipment, and fuel for manufacturing purposes is only in very moderate request. Although the large firms generally maintain about late rates, the smaller proprietors are, in many cases, pushing sales at low prices, and the market generally is weak. The average quotations at the pit mouth in the Wigan district are about 11s. 6d. to 12s. for best Arley; 9s. 6d. to 10s. 6d. for seconds; 9s. to 10s. for Pemberton four-feet; 7s. to 8s. for common coal; about 6s. for burgy; and 3s. 9d. to 4s. 6d. per ton for slack.

A reduction of 15 per cent. in colliers wages throughout South-West Lancashire has been resolved upon, and notices to that effect were posted at the various pits on Wednesday last, and will come into force in the first week of July.

In the iron trade there has been very little doing during the past week, and there is a want of firmness in the market, brands from outside districts being offered at lower prices. Lancashire makes of pig iron are still quoted at 58s. 6d. per ton for No. 3 foundry, and 57s. 6d. per ton for No. 4 forge, but concessions would be made to secure business. Middlesbrough brands delivered here are offered at as low as 53s. 3d. for No. 3 foundry, and 52s. 3d. for No. 4 forge. Finished iron is excessively dull, and although nominally prices are the same as those last quoted, makers would accept good specifications at 5s. per ton below the list rates.

All the works are very slack, and it is not improbable that more of the local blast furnaces may have to be blown out. The large locomotive works at Crewe, employing about 7000 men, are being put on short time this week, and this is in a great measure attributable to the present depression in the trade.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The Durham gas coal trade is extremely dull. The quotations are from 7s. to 8s. 6d. per ton; but in some instances inferior qualities may be bought at 6d. per ton lower. The Durham coalowners have given their men notice of a reduction of wages. At present the Miners Association are indisposed to have the matter referred to arbitration; but it is hoped, after the usual fortnightly notice has been served upon the men, a satisfactory and mutual arrangement may be come to. The manufacturing coal trade of Durham is very much depressed. There was a large failure at Darlington last week, which has had a tendency to destroy confidence, and business is not in at all a satisfactory condition in that district. Steam coals have been in very fair demand, especially for the best qualities. Turns are 14 days, which shows that this section of the coal trade is firm. A quiet business is doing in household coals.

Handy sailing coasters are somewhat scarce in the Tyne, which at present is extremely bare of shipping. A little more money has, therefore, to be given to ready ships, but upon the whole the freight market is without much change. The principal part of the coasting trade is being done by steamers, and the following are the quotations:—London 4s. 3d., Rochester 4s. 7½d., Havre 6s. 3d., Antwerp 6s., Dieppe 6s. per ton. Hamburg £6 10s., Bordeaux £8 10s. per keel. A fair business is doing to the Baltic, and the prospects of the corn trade are improving. This trade is likely to employ a considerable number of steamers during the summer and autumn, at a fair profit. With regard to the iron and general trade of the Tyne and district, it is extremely dull. The iron trade gets no better. Manufacturing iron is in poor demand, and a somewhat desponding view is taken of the summer prospects of this trade. The chemical business is very quiet indeed. It does not pay at the quotations current in the market. There is less demand for fire-clay goods than there was last year. As before stated, the only branch of trade in the North of England that shows any activity at all is building. Workmen are somewhat difficult to be had, and bricks and slates are abnormally high compared with the value of other material. The tendency outside this trade, however, is to lower wages and less employment. There is no speculative business doing at all, and it is some years since the Quayside of Newcastle presented so dejected an appearance.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Since last week's "Notes" were despatched, various reports have come to hand regarding reductions in the price of gas. Beginning with Perth, I may mention that a meeting of the Gas Commission of that city was recently held, at which the accounts for the past year were laid on the table, showing the expenditure to have been £12,873 12s. 5d., including sums set apart for sinking-fund, &c.; and the revenue amounted to £14,414 9s. 10d., leaving a surplus of £1540 7s. 5d. to be carried forward to next year. In moving the adoption of an estimate of the expenditure for the ensuing year, Mr. Mackenzie intimated that the estimates showed a reduction of 10d. in the price of gas to ordinary consumers. The estimates were unanimously approved of, and favourable comments were made on the manner in which the works had been conducted by the highly respected manager, Mr. Whimster. The price is now to be 4s. 7d. per 1000 cubic feet in Perth proper, and 5s. 5d. in the village of Scone. While speaking of Perth gas affairs, I may incidentally state that the illuminating power of the gas for the month of May was—Maximum, 28·1 standard candles; minimum, 26·6 candles; average, 27·43 candles.

The annual meeting of the Inverurie Gas Company was lately held, and the affairs of the company were so satisfactory that the directors announced a reduction of price to the extent of 5d. per 1000 cubic feet of gas. The charge will now be 8s. 4d.

At a special general meeting of the Carnoustie Gaslight Company, held on the 8th inst., it was resolved to extend the duration of the contract of co-partnery for another period of 21 years, dating from July 31, 1876, the capital stock of the company to be £5000, divided in 4000 shares of £1 5s. each. At the same time several important alterations and additions to the deed of co-partnery were passed by the meeting.

The directors of the Brechin Gas Company have agreed to reduce the price of gas from 5s. 5d. per 1000 cubic feet to 5s., and to give, in addition, a discount of 3d. per 1000 feet for ready money, or on accounts paid within a month. Most of the consumers pay their accounts promptly, and hence this is equivalent to 4s. 9d. per 1000 feet. The dividend proposed by the directors is 5½ per cent. on the increased capital. A meeting of the Police Commissioners of Brechin has just been held, for the purpose of considering a report from a committee appointed at a former meeting to inquire into the gas supply of the town. After a good deal of discussion the report was agreed to by eight against three. It was as follows:—"The committee having met for the purpose of considering the matters remitted to them at last meeting of Police Commissioners, unanimously agreed to recommend that the commissioners should resolve to apply for a Provisional Order, empowering them either to construct new works for the manufacture and supply of gas, or to acquire the existing works belonging to the Brechin Gaslight Company, as may be deemed most advisable in the interests of the community; and should appoint a committee, with power to take such measures as may be necessary to carry said resolution into effect."

On Wednesday evening the annual general meeting of the shareholders of the Kinross and Milnathort Gaslight Company was held—Mr. John W. Williamson, sheriff-clerk, presiding. From the report which was submitted by the directors, it was shown that the company's affairs were in a prosperous state. A dividend of 5 per cent. was declared, and upwards of £150 was reserved towards meeting the expenses of the extensive alterations and additions which are about to be made to the company's works, and which are estimated to cost upwards of £1000. The meeting also resolved to reduce the price of gas from 7s. 6d. to 7s. 1d. per 1000 cubic feet.

The Selkirk Gaslight Company have reduced the price of gas from 6s. 8d. to 5s. 10d. per 1000 cubic feet, the profits of last year admitting of a bonus of 2½ per cent. to the shareholders, in addition to usual dividend of 10 per cent.

A meeting of the Wishaw Gas Company was held last Tuesday evening, when it was resolved to reduce the price of gas from 5s. to 4s. 7d. per 1000 cubic feet. An amendment to reduce the price to 4s. 2d., the rate at which the gas stood before the great advance in the price of coal, was lost.

The annual meeting of the Kirkintilloch Gas Company was held on Thursday last—Mr. Malcolm Maitland in the chair. It appears from the directors report that there had been a profit during the past year of £732 10s. 3d., after deducting £243 12s. 7d. for depreciation of works. The directors recommend a dividend of 8 per cent., taking £560 on the paid-up capital—£7000. Several members were of opinion that the dividend should have been larger, or that a bonus of 2s. per share should have been added to the 8 per cent. After some discussion the report was adopted. The reserve-fund is £1558 7s. 8d., which, it was agreed, was ample, and the directors were urged to reduce the price of gas to 5s. per 1000 feet. In reply, the chairman intimated that the price would be 5s. from the 15th of last month. The retiring directors were unanimously re-elected.

Mr. J. F. Bateman, C.E., F.R.S., is about to visit Perth for the purpose of making a preliminary survey regarding the best and cheapest mode of obtaining an additional water supply for that city. The expenses are to be defrayed by a number of the citizens who have collected a private subscription.

Another pipe on the Lintrathen water track has burst near Meigle Junction.

On one or two days since last report the Glasgow pig iron market has been firm, but the week closes with a quiet market, and the price down at 57s. 7½d. cash and fourteen days for warrants.

There is no alteration to record in respect of the prices in the Glasgow coal market, nor is there any material change in the condition of the trade generally. Shipments have slightly improved during the past week.

HULL GAS SUPPLY.—Mr. James Baynes reports that the gas supplied to the district of Sculcoates and Myton during May by the British Gaslight Company gave the following results for illuminating power and sulphur compounds, the gas being at all times free from sulphuretted hydrogen and free ammonia:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·23	15·28	15·91
Grains of sulphur per 100 feet	34·00	32·00	32·20

Mean barometer and temperature in experiment-room:—Bar., 30·14; tem., 60°.

In the east district Mr. James Baynes, jun., reports that the gas supplied to this district by the Sutton, Southcoates, and Drypool Gas Company during May gave the following:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·37	15·16	15·90
Grains of sulphur per 100 feet	—	—	6·50

Mean barometer and temperature in experiment-room:—Bar., 30·05; tem., 57·66°.

PROPOSED PURCHASE OF THE WAKEFIELD WATER-WORKS COMPANY.—The Sub-Parliamentary Committee of the Town Council of Wakefield met the directors of the Wakefield Water-Works Company on the 12th inst., for the purpose of endeavouring to come, if possible, to a settlement relative to the purchase of the works and plant of this company. There was a full meeting, nearly all the members of the committee being present, the mayor acting as spokesman in the stead of Alderman Holt, the chairman of the committee, who was unable to attend the meeting. The gentlemen present on behalf of the water-works company were Mr. Wm. Statter (the chairman), Alderman Connor, Mr. George Haldane, Mr. Wm. Stewart, and Mr. Cardwell. The corporation, through their representative committee, offered to give the company the same terms as they had previously offered — namely, £48 for every £25 share, and £25 for every £12 10s. share, there being 840 of the former, which would realize a sum of £40,320, and no less than 3816 of the lesser shares, making a grand total on account of these of £135,720. Besides these there came the consideration of the shares which have been issued since negotiations were previously entered into, and abruptly terminated, the company having in the meantime been at an expense, as the corporation think very needlessly, of about £30,000, and towards this they have made an offer of £15,000, believing that a fully sufficient sum to advance in the interests of the ratepayers. A subsequent offer of an additional £10,000 was made, bringing the aggregate to £160,000 for the undertaking, including the entire stock and rights of the company, but the directors of the water-works company declined the terms offered them. They state that they will not recommend the shareholders to agree to the wishes of the committee, and hence the only result must presumably be a contest in the House of Lords, for which the corporation have been making every preparation.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2171.—FAULKNER, J., Manchester, "Improved electrical appliances for lighting gas in public and private buildings." May 23, 1876.

2181.—DAVIES, P. J., King's Cross, London, "Improvements in liquid-meters." May 23, 1876.

2240.—DENNIS, W., Holborn Viaduct, London, "Improvements in apparatus and pumps for forcing and discharging water, air, and other fluids and gases for extinguishing fires, and for other useful purposes." May 27, 1876.

2243.—BUTLER, G., Southwark, London, "Improvements in valves or cocks." May 27, 1876.

2254.—BELDAM, A., Fenchurch Street, London, "An improved packing for the stuffing-boxes of steam-engines and pumps, and for other joints requiring to be made steam, air, or water-tight." May 29, 1876.

2299.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in gas-meters." A communication. May 31, 1876.

2314.—DEACON, G. F., Liverpool, "Improvements in valves for reducing or regulating fluid pressure." June 1, 1876.

2316.—SAXBY, F. E., Windsor, Liverpool, "Improvements in and relating to valves for reducing or regulating the pressure in mains, pipes, and other conduits." June 1, 1876.

2350.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improved apparatus for generating and distilling carburetted hydrogen gas from coal or other carbonaceous materials." A communication. June 5, 1876.

2354.—BECKETT, F. R., Chelmsford, Essex, "Improvements in the construction of valves for regulating the flow of steam, water, gas, or other fluids." June 6, 1876.

2355.—FISH, W. S., Glasgow, "Improvements in motive-power engines, the same being also applicable to pumps." A communication. June 6, 1876.

2360.—SCHNELL, J. F., Castleford, York, "Improvements in lamps and burners, and in the means or apparatus employed for generating gas for the same from benzoline for illuminating purposes." June 6, 1876.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

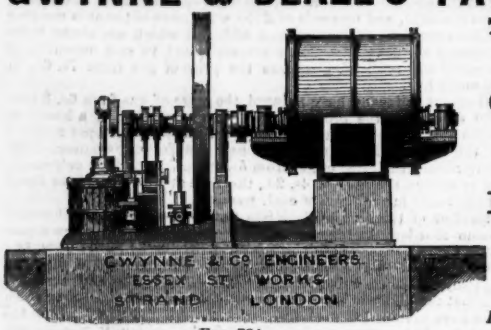


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.
HAVE MADE THE
LARGEST AND MOST PERFECT
EXHAUSTING MACHINERY
Ever produced, and the most economical in working.

Prices and every information on application.

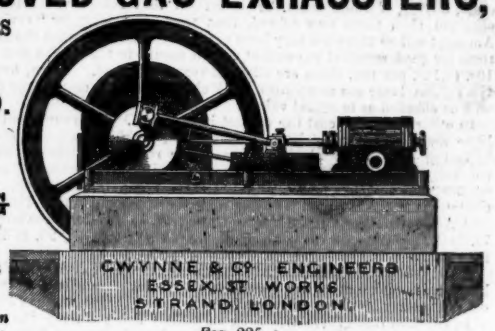
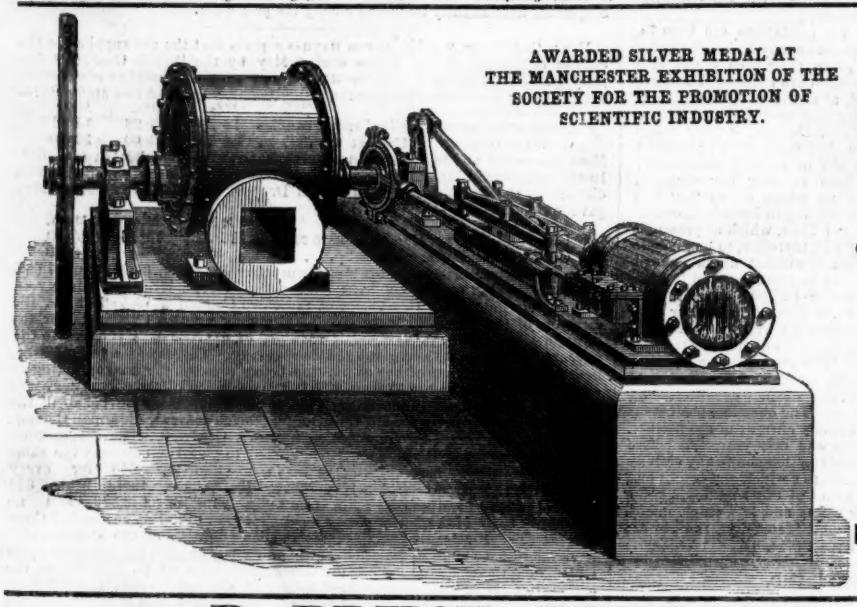


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.
G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.



AWARDED SILVER MEDAL AT THE MANCHESTER EXHIBITION OF THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

BEALE'S
Improved Patent
GAS-EXHAUSTERS
WITH
ENGINES COMBINED.

Sole Makers,
GEORGE WALLER & CO.

Makers of
ENGINES, EXHAUSTERS,
INDEX and DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, and other PUMPS,
SCRUBBERS and PURIFIERS,
CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,
HOLLAND STREET, S.E.,
AND
STROUD, GLOUCESTERSHIRE.

D. BRUCE PEEBLES & CO.,
ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF WET AND DRY GAS-METERS;
Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,
ABOVE 30,000 OF WHICH ARE NOW IN USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*
D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

WANTED, a good steady Stoker for a small Gas-Work. Must be able to drive an Exhauster.

Applications, with testimonials, stating age, and wages required, to be made to X., Gas-Works, WALTHAM CROSS.

WANTED, by a thoroughly practical Man, who will shortly be disengaged, a re-engagement as MANAGER of a Gas or Gas and Water Works. Is well experienced in every department. Can produce first-class testimonials and references.

Address No. 265, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, the Management of a Gas-Work, by a Man thoroughly experienced in the manufacture of gas, retort-setting, main-laying, &c. Understands the manufacture of sulphate of ammonia. Would undertake the collection if required. Undeniable testimonials.

Address No. 274, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED immediately, by a Gas Engineering Firm, DRAUGHTSMAN and MANAGER in the Engineering Department. He must be thoroughly experienced in the construction and erection of Gas-Works plant. A good situation and permanent, with progressive salary, to a qualified and confidential person.

Address, with references and salary required, No. 273, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Working MANAGER in a small country GAS-WORKS. Is thoroughly acquainted with the manufacture and distribution of gas, retort-setting, main and service laying, &c. Twenty years experience. Eleven years in present situation.

Address T. CRESSWELL, Gas-Works, Cuckfield, SUSSEX.

COKE.

WANTED, a supply of Gas Coke, delivered in Wolverhampton district.

Address NORTH BROTHERS, 49, Queen Street, WOLVERHAMPTON.

THE Hong Kong and China Gas Company, Limited, require a good GAS-FITTER to proceed to Hong Kong on a five years engagement.

Apply to the SECRETARY, 148, Gresham House, OLD BROAD STREET, E.C.

ADVANTAGES OF GAS FOR
COOKING AND HEATING.
HINTS ON GAS BURNERS, &c.
By MAGNUS OHREN, A.I.C.E., F.C.S.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

WANTED, a Working Manager, for the Hornsea Gaslight and Coke Company, Limited. He must thoroughly understand the manufacture and distribution of gas, main and service laying, retort-setting, &c., &c.

Applications, stating salary required, and accompanied by copies of testimonials, to be addressed to the CHAIRMAN of the Company, Hornsea, near HULL.

SMALL GAS-WORKS, AYLSHAM, NORFOLK.

WANTED, by the Directors of the Aylsham Gas Company, Limited, a MAN thoroughly understanding the manufacture and distribution of gas, to take sole charge of the works. Salary £1 per week. House, coals, and gas.

Applications, stating number of family (if any) with testimonials, to be sent to me on or before the 1st day of July next.

W. HENRY SCOTT, Secretary.

Aylsham, June 16, 1876.

BRITISH ASSOCIATION OF GAS MANAGERS.
VISIT TO BECKTON, JUNE 15, 1876.
PHOTOGRAPHIC GROUPS OF MEMBERS
(about 300 in each Picture), taken on the above occasion, can be had at 3s. 6d. each, post free.
Stamps or Post-Office Orders to
F. WELLS, BARKING, ESSEX.

TO FOREMEN STOKERS, AND MAIN AND SERVICE LAYERS.

WANTED, a good Carbonizing Foreman; also a good MAIN AND SERVICE LAYER. None but thoroughly competent and reliable men need apply.

Applications, with testimonials, to be addressed to Mr. Jos. HALL, Manager, Gas-Works, St. Helens, LANCASHIRE.

WANTED, a situation, by a steady, competent Man as WORKING FOREMAN or Leading Hand for Gas or Water Work or Management of small Gas-Works, or Fittings of an Estate or Institute. Four years character and references as erecting and travelling fitter.

Address A. B., 11, Langford Road, Haverstock Hill, LONDON, N.W.

TRAVELLER, calling upon Gas and Water Companies, Engineers, &c., seeks a RE-ENGAGEMENT. Thoroughly experienced. Good address. Address S., 2, Aldbury Grove Road, WALTHAM CROSS.

REQUIRED, a sober steady Man as STOKER. Constant employment. Wages 24s. 6d. per week. Overtime paid.

Address, in own handwriting, with reference for character, Mr. T. H. BOOTHELL, Gas-Works, SLEAFORD.

THE Advertiser, practical and experienced, seeks an engagement as MANAGER of Gas-Works. Is thoroughly conversant with the best methods of manufacture and distribution of gas. Good testimonials and references.

Address No. 275, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two 6 ft. by 5 ft. 6 in. PURIFIERS, with 5-in. connexions complete.

Apply to SECRETARY, Gas-Works, Whitchurch, SALOP.

FOR SALE—Six round Retorts, 8 ft. 9 in. by 13 in., lying at Corbridge Retort-Works (W. Walker's). Also a lot of 13-in Mouthpieces, 4-in. Ascension, Bridge, and Dip-Pipes, 12-in. Hydraulic Main, lying at Morpeth Gas-Works.

The above will be sold a bargain.

Apply to ROBERT WATSON, Manager, Gas-Works MORPETH.

ON SALE—One Round Station-Meter, to pass 12,000 feet per hour, with 8-in hydraulic valves and bye-pass. Will be thoroughly overhauled and fitted with new drum.

Apply to J. AND J. BRADDOCK, Globe Meter-Works, OLDHAM.

SEVERAL wrought-iron Tanks for Sale, fitted for railway trucks, and suitable for carrying gas tar or liquor. Also an old BOILER, 30 ft. by 7 ft., for storing liquor.

Apply to D. M., 10, Mark Lane, LONDON, E.C.

STATION-METER for Sale, in good condition (Makers West and Gregson), in very ornamental case, fitted up with tell-tales, inlet, outlet, and bye-pass valves, and 12-in. connexions. Passes 25,000 cubic feet per hour. Now replaced with a larger one.

For price, &c., apply to JOHN W. WHITAKER, Manager, Gas-Works, WAKEFIELD.

PURIFIERS FOR SALE.

FOUR Purifiers, 12 ft. square, four tiers of wood sieves, centre-valve, 15-in. connexions, convenient apparatus for raising covers; the whole in good condition. Must be removed at once. Will be sold very cheap.

Applications to be made to Mr. HENRY BOWEN, Gas-Works, CARDIFF.

June 14, 1876.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—

A 6-h.p. Patent Trunk Engine. (Beale.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)

Exhauster to pass 15,000 feet per hour. (Beale.)

An 8-h.p. Grasshopper Engine. (Easton and Amos.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)

Exhauster, 20,000 ft. per hour. (Beale.)

Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.

Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.

Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.

Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.

A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.

May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.

Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

BOROUGH OF BURNLEY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation are prepared to receive TENDERS for a supply of COAL and CANNEL, for One, Two, or Three years. The Coal must be from the Arley Mine, and the Cannel from the best Wigan seams. Special facilities for delivery can be obtained. The quantities required for the first year will be 12,000 tons of Coal, and 2000 tons of Cannel, to be delivered at the Gas-Works Wharf on the Leeds and Liverpool Canal. For the second and third years, the Corporation will expect to be supplied with any additional quantity they may require at the contract price.

Further particulars may be obtained on application to Mr. S. F. Leather, Gas Engineer, Burnley, to whom all tenders, endorsed "Tender for Supply of Coal," must be sent on or before Thursday, the 22nd day of June inst.

By order.

A. B. CREEKE, Town-Clerk.

Corporation Offices, Burnley, June 8, 1876.

TO GASHOLDER MAKERS.

THE Atherton Local Board invite TENDERS for the construction, at their works, of a Single-Lift GASHOLDER, 80 ft. in diameter and 26 ft. deep.

Drawings and specification may be seen on application to the undersigned, at the Office of the Local Board, Water Street, Atherton.

Tenders to be sent in on or before July 10, 1876, sealed and endorsed, "Tender for Gasholder."

The Board do not bind themselves to accept the lowest or any tender.

By order,

DANIEL SCHOFIELD, Clerk.

EPSOM AND EWELL GAS COMPANY, LIMITED.

TENDERS are invited for all or part of £4800 Five per Cent. DEBENTURES of this Company, in sums of £100 each. Interest payable half yearly, by coupon, at the Company's Bankers. This amount is the only debt of the Company (whose property is free of all mortgage), and is only required to renew an existing debt of the same amount about falling due.

Tenders, to be made by letter, addressed either to the SECRETARY of the Gas Company, EPSOM; or to Messrs. HENRY KIMBER AND COMPANY, Solicitors for the Company, 79, Lombard Street, LONDON, on or before the 30th day of June inst.

TO GASHOLDER MAKERS.

THE Directors of the Longwood Gas Company invite TENDERS for the construction of a Telescopic GASHOLDER, 90 ft. diameter and 22 ft. deep.

Plans and specifications may be seen on application to the Engineer, at the Gas-Works, and tenders addressed to the undersigned must be sent in on or before Wednesday, the 28th inst.

The Directors do not bind themselves to accept the lowest or any tender, and no allowance will be made for tenders.

By order,

SAMUEL KENWORTHY, Secretary.

Gas-Works, Longwood, Huddersfield, June 12, 1876.

TO GASHOLDER MAKERS, &c.

THE North Ormesby Gas Company, Limited, are prepared to receive TENDERS for the construction of a GASHOLDER and a set of Four PURIFIERS, &c., at their works at North Ormesby.

Plans and specification may be seen, and information obtained, on application to the Office, 9, West Terrace, North Ormesby, near Middlesbrough.

Tenders to be sent in on or before June 22, 1876, sealed and endorsed "Tender for Gasholder, &c."

The Company do not bind themselves to accept the lowest or any tender.

THOS. THOMAS, Secretary.

May 7, 1876.

THE Directors of the Surrey Consumers Gas Company are desirous of receiving TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at their works, for Twelve months from the 1st of July next.

The Tar and Liquor will be delivered free into barges at the Company's wharf, and are to be paid for monthly.

Further information may be obtained on application at the Company's Offices, Rotherhithe Street, where the tenders are to be sent in, on or before Saturday, the 24th of June.

The Directors do not bind themselves to accept the highest or any tender.

W. P. BODDY, Secretary.

Rotherhithe, June 15, 1876.

THE Directors of the Pembroke Dock and Town Gas Company, Limited, invite TENDERS for the supply of the undermentioned quantities of best proved Cast-Iron PIPES, spigot and socket joints.

450 yards of 2-in.
1000 " 3-in.
550 " 4-in.

Tenders to state price, delivered into Pembroke Dock Railway Station, and the earliest date after July 1 they can be supplied.

Any further information can be obtained of the undersigned, to whom all tenders are to be addressed.

By order,

JAMES H. SILCOX, Manager.

Gas-Works, Pembroke Dock, June 16, 1876.

BLACKPOOL BOROUGH GAS-WORKS.

TO GASHOLDER MAKERS.

THE Gas Committee of the Corporation invite TENDERS for the construction of a GASHOLDER, 101 ft. diameter and 26 ft. deep.

Plans and specifications may be seen at the Office of the undersigned.

Tenders, properly endorsed, to be addressed to the Chairman of the Gas Committee, before the 26th day of June next.

The Committee do not bind themselves to accept the lowest or any tender.

By order,

JOHN CREW, Engineer and Manager.

Gas-Works, Princess Street, Blackpool,
June 14, 1876.

SOUND AND DESIRABLE INVESTMENTS.
Consisting of Fully Paid-up Shares in the Wandsworth and Putney Gaslight Company.

MR. EDWARD SAUNDERS is in- structed by the Executors of the late Miss A. Wallis to SELL BY AUCTION, at the Auction Mart, Tokenhouse Yard, near the Bank of England, on Tuesday, July 11 next, at Two o'clock precisely, in 13 Lots, FIFTY ORIGINAL £10 SHARES in the Wandsworth and Putney Gaslight Company, fully paid up, and on which dividends at the rate of 10 per cent. per annum are paid half yearly; Ten £10 Shares in the same Company, created by their Act of 1856, also fully paid up, and receiving dividends half yearly equal to 7½ per cent. per annum; and Fifty £10 Shares also in the same Company, created under their Act of 1866, all fully paid up, the dividends on which are payable half yearly, and amount to 7 per cent. per annum.

Particulars, with conditions of sale, may be obtained ten days prior to the auction, at the Spread Eagle Hotel, Wandsworth; the Auction Mart, Tokenhouse Yard; and of MR. EDWARD SAUNDERS, the Auctioneer, 6, Bishopsgate Street Without, LONDON.

FRASER'S GAS TRADE CIRCULAR, to be published on the 1st of July next, will contain a vast amount of information valuable to Engineers and Gas Managers. Price 3d.

Apply to A. C. FRASER, St. Stephen's Chambers, TELEGRAPH STREET, E.C.

CATHELS'S IMPROVED

RETORT-SETTINGS.

GUARANTEED TO HEAT UNIFORMLY WITH THE MINIMUM OF FUEL.

Coloured lithograph copies of Working Drawings of beds, of 1, 2, 3, 5, 6, and 7 Retorts each, so clearly arranged and fully shown, as to be easily understood by any retort-setter or bricklayer, having just been made of these valuable settings, they can now be supplied with detailed specifications, immediately on receipt of orders.

Applications to be made to Mr. THOS. NEWBIGGING, Gas and Consulting Engineer, 5, Norfolk Street, MANCHESTER.

DALTON-IN-FURNESS GAS-WORKS.

TO IRONFOUNDERS AND OTHERS.

THE Dalton Gas Committee invite TENDERS for the supply and erection of a single-lift 40-ft. GASHOLDER, 15 ft. deep; four 6-ft. PURIFIERS, with five wood trays each; a Walker's Centre-Valve and 6-in. connexions complete; also for a cast-iron Scrubber and other appendages.

Drawings and specifications may be seen, and further information obtained, at the Office of the undersigned, Market Place, Dalton, on and after the 19th inst.

Sealed tenders to be sent in on or before the 1st day of July next.

The Committee do not bind themselves to accept the lowest or any tender.

FRANCIS HENRY CLARK, Secretary.

TEIGNMOUTH GAS-WORKS.

THE Teignmouth Local Board are desirous of receiving TENDERS for the construction of a Cast-Iron TANK, 61 ft. 4 in. diameter and 18 ft. deep, and a GASHOLDER, 60 ft. in diameter and 18 ft. deep, complete, at the Gas-Works.

Printed copies of the specification may be obtained on application at the Office of Mr. Turner, Surveyor to the Board, at my Office; or at the Office of Mr. Thomas Band, Civil Engineer, Post-Office Chambers, Exeter, of whom further information may be obtained.

Sealed tenders, endorsed "Tender for Gasholder," to be delivered at my Office, on or before Saturday, the 24th day of June, 1876.

The Local Board do not bind themselves to accept the lowest or any of the tenders.

By order of the Teignmouth Local Board,

W. B. HALL JORDAN, Clerk.

Teignmouth, June 3, 1876.

PONTYPOOL GAS AND WATER COMPANY.

TO EXCAVATORS, BRICKLAYERS, &c.
CONTRACT No. 1.

THE Directors of the Pontypool Gas and Water Company are desirous of receiving TENDERS for the excavating, concreting, and building of brick piers for a Cast-Iron GASHOLDER-TANK, 66 ft. diameter and 21 ft. 9 in. deep, at their Gas Station, Trosnant, Pontypool.

The drawings and specification, with form of tender, may be inspected, and all particulars obtained, on application to the undersigned.

Tenders, enclosed in a sealed envelope, endorsed "Tender for Excavation, &c., Contract No. 1," addressed to Edmund Butler Edwards, Esq., Chairman, Pontypool Gas and Water Company, Pontypool, Mon., to be delivered at the Company's Offices not later than Monday, the 10th day of July proximo.

The Company do not pledge themselves to accept the lowest or any tender.

By order of the Directors,

ANDREW HAIR, Secretary and Manager.

Gas and Water Offices, Mill Road, Trosnant,
Pontypool, Mon., June 15, 1876.

PONTYPOOL GAS AND WATER COMPANY.

TO IRONFOUNDERS AND GASHOLDER MAKERS.
CONTRACT No. 2.

THE Directors of the Pontypool Gas and Water Company are desirous of receiving TENDERS for the supply and construction of a Cast-Iron GASHOLDER-TANK, 66 ft. diameter and 21 ft. 9 in. deep; also a Single-Lift GASHOLDER to work therein, 65 ft. diameter and 21 ft. 6 in. deep, with columns, wrought-iron lattice-work girders, guides, and pulleys, &c., complete, at their Gas Station, Trosnant, Pontypool.

The drawings and specification, with form of tender, may be inspected, and all particulars obtained, on application to the undersigned.

Tenders, enclosed in a sealed envelope, endorsed "Tender for Cast-Iron Tank and Gasholder, Contract No. 2," addressed to Edmund Butler Edwards, Esq., Chairman, Pontypool Gas and Water Company, Pontypool, Mon., to be delivered at the Company's Offices not later than Monday, the 10th day of July proximo.

The Company do not pledge themselves to accept the lowest or any tender.

By order of the Directors,

ANDREW HAIR, Secretary and Manager.

Gas and Water Offices, Mill Road, Trosnant,
Pontypool, Mon., June 15, 1876.

LEEK IMPROVEMENT ACT, 18.5.

CONTRACT FOR GAS COAL.

THE Commissioners acting under the Leek Improvement Act, 1855, invite TENDERS for a supply of the best GAS COAL to their Works, for One, Two, or Three years, commencing the 1st of July next, delivered free at the North Staffordshire Railway Station or Canal Wharf, Leek, in such quantities and at such times as may be required by the Manager of the said Works, or by the undersigned. Annual consumption about 3500 tons.

Endorsed tenders to be received not later than Four o'clock p.m., on Monday, the 26th inst., addressed to "The Chairman of Gas Committee, Leek."

The Commissioners do not bind themselves to accept the lowest or any tender.

By order of the Commissioners,

C. HENSHAW, Clerk.

Public Offices, Leek, June 7, 1876.

SUNDERLAND GAS-WORKS.

CONTRACTS FOR IRON ROOFING, RETORT-FITTINGS, CONDENSERS, AND OTHER APPARATUS.

THE Directors of the Sunderland Gas Company are prepared to receive TENDERS for the construction and erection of certain Wrought-Iron ROOFING, required for the extension of the Hendon Station of their Gas-Works, comprising roofs of 52 ft. and 34 ft. span or thereabout; and also for the Gas-Making and Condensing APPARATUS, comprising 168 Retort Mouthpieces, and the furnace fittings and ascension-pipes connected therewith, two Hydraulic Mains, one set of Condensers, cast-iron Floor Plates, Chimney Cap, and other materials and apparatus.

Drawings may be seen, and specification and form of tender may be had, on application at the Office of the Company, in Fawcett Street, Sunderland, and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Wednesday, the 7th day of June inst., and tenders must be delivered at the Office of the Company, at or before Ten o'clock in the Forenoon of Tuesday, the 4th day of July next.

The Company do not pledge themselves to accept the lowest or other tender.

By order,
J. H. Cox, Secretary.

Sunderland, June 3, 1876.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.

The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.

W. J. Warner, Engineer.

South Shields.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

D. M. NELSON,

43, GORDON STREET (late 135, BUCHANAN ST.),
GLASGOW,

Supplies every requisite in connexion with the distribution of Gas and Water.

Estimates and prices on application.

WOOD GRIDS for Purifiers and Scrubbers.
Cast-Iron PIPES and VALVES.
Street LAMP-PILLARS.
Patent Pipe SCREWING-MACHINES, &c.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street Westminster.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. Manwaring, 101 Cannon Street, E.C.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Charles Horsley, Agent.

THOMAS CARR & SON,

MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS,
&c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

PLUTONIC CEMENT,

For Repairing Gas-Retorts in Action, preventing Porosity, and reducing the Deposit of Carbon, is highly commended.

WILLIAM RICHARDSON,

Gas and Hydraulic Engineer,
CHARLES HENRY STREET and BISSELL STREET,
BIRMINGHAM.

CHELTENHAM GASLIGHT & COKE COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

THE Directors of the Cheltenham Gas-light and Coke Company invite TENDERS for the supply of the best quality of GAS COAL and CANNEL, for the year commencing the 1st of July next.

For quantities and conditions of contract, application to be made to the Company's Engineer.

Sealed tenders, addressed to the Engineer, must be forwarded on or before Thursday, the 22nd proximo.

The Directors do not bind themselves to accept the lowest or any tender.

R. O. Paterson, Engineer.

Gas-Works, Cheltenham, May 29, 1876.

GLASGOW CORPORATION GAS.

TENDERS FOR GAS OR CANNEL COAL WANTED.

THE Glasgow Corporation Gas Commis-sioners are prepared to receive TENDERS for the supply of GAS or CANNEL COAL to be delivered at their different works.

Forms of tender may be had on application at the Gas Office, Virginia Street; and sealed tenders, marked "Tender for Coal," and addressed to the Committee on Gas Supply, 42, Virginia Street, Glasgow, will be received there on or before the 24th of June.

The Commissioners do not undertake to accept the lowest or any tender.

J. D. Marwick, Town-Clerk.

City Chambers, Glasgow, May 30, 1876.

TOWN OF DUDLEY GASLIGHT COMPANY.

CONTRACT FOR GAS COALS.

THE Directors of the above Company invite TENDERS for the supply of from 6000 to 12,000 tons of screened GAS COAL, as free from sulphur as possible, to be delivered in trucks, free at Netherton Station, Great Western Railway, or L. & N. W. Railway, Dudley Station, between July 1 next, and June 30, 1877.

Rates of delivery subject to arrangement.

Terms of payment monthly, in net cash.

Tenders to be addressed to the Secretary, and endorsed "Tender for Gas Coal," on or before the 27th inst.

The Directors do not bind themselves to accept the lowest or any tender.

Gas-Works, Dudley, June 14, 1876.

CITY OF CARLISLE.

TENDERS FOR COAL.

THE Carlisle Gas Committee are pre-pared to receive TENDERS for the supply of 10,000 tons of best screened GAS COAL. Deliveries to extend as may be directed, from July, 1876, to June, 1877.

The Coals are to be the best of their kind, and free from sulphur, bats, bind, refuse, and dirt, and must be delivered free at any of the railway stations in Carlisle.

Payments will be made monthly, if, and so long as, the Contract shall be duly fulfilled.

Sealed tenders, specifying the description of Coals, and the pits at which they are to be raised, must be endorsed "Tender for Coals," and delivered on before the 30th inst.

J. Hepworth, Manager.

Gas-Works, Carlisle, June 8, 1876.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR which will be produced at their Works, New Crane, Wapping, during a period of One year, commencing on the 1st day of July next.

Further particulars may be obtained on application to the Engineer at the said Works.

Tenders, marked "Tender for Gas Liquor," must be sent to this Office not later than Thursday, the 29th inst.

The Directors do not bind themselves to accept the highest or any tender.

E. J. Southwell, Secretary.

Commercial Gas-Works, Stepney.

TENDERS FOR COALS.
SPECIFICATION.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 21,000 tons of SOFT COALS and SOFT COBBLES or NUTS, to be divided into Three Contracts, of 7000 tons each; and to be delivered in the following monthly quantities, viz.:—

1876—	July	500
	August	700
	September	800
	October	900
	November	900
	December	900
1877—	January	800
	February	700
	March	500
	April	300
	Total of each contract	7000

The Company will undertake to receive from the party or parties contracting the total quantity of 21,000 tons, in one, two, or three contracts, as the Board may decide; but they do not bind themselves to accept the lowest or other tender or tenders, until after a satisfactory trial of the Coals and Cobbles or Nuts to which such tender or tenders may relate shall have been made. They are to be the best of their kind, and as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed upon a correctly adjusted machine.

Payments will be made monthly, if, and so long as, the contracts shall be duly fulfilled, to the extent of nine-tenths of the amount of the invoices, and the balance will be discharged on the satisfactory completion of the contract.

Sealed tenders (to be made on forms obtainable at the Company's Office), specifying the description of Coals and the pits at which they are to be raised, and stating the prices for delivery by canal at Derby at the New Gas-Works, adjoining the Midland Railway Company's premises, or at the canal wharf, and also the price delivered at either of the Midland Railway Stations, Derby, and in manner and subject to the conditions aforesaid, must be delivered at the Offices of the Company, Friar Gate, on or before Saturday, the 1st day of July next.

The respective contracting parties will be required to execute an agreement to be prepared by, and to the satisfaction of, the Secretary of the Company.

By order of the Directors,
Isaac Fisher, Secretary.

Derby Gas Office, June 16, 1876.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

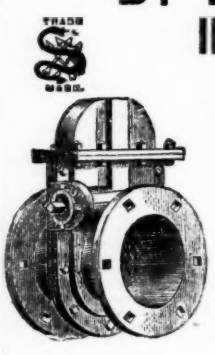
ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES



WITH WROUGHT-IRON PINIONS,

List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.
Also, SCREW WATER-VALVES WITH GUN-METAL FACES.

ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS.

B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
55a, BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.

A LARGE STOCK ALWAYS IN HAND OF

IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,

AND EVERY DESCRIPTION OF

GAS AND WATER FITTINGS.

THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.

STREET LAMPS AND COLUMNS IN GREAT VARIETY.

WORKS: LONDON AND BIRMINGHAM.

GAS MOONS, Cut and Engraved, of the newest designs

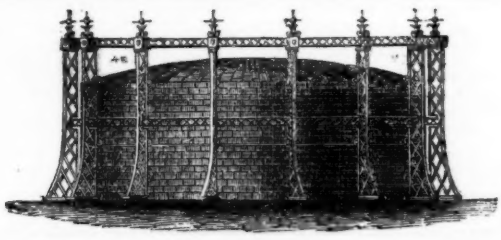
GAS REFLECTORS In Silver and Glass

GAS NIBS AND BURNERS Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.

ESTABLISHED 1830.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

SZERELMEY

ANTI-CORROSIVE COMPOSITIONS. SZERELMEY IRON PAINT having been in use for upwards of twenty years, has stood the test of time. SIR CHARLES BARRY reported to the Chief Commissioner of Works (in 1859) that the Iron Roofs of the Westminster Palace, coated in 1856, "Still afford the most convincing and satisfactory evidence of its efficacy," and anyone who looks at the work now, in 1876, will see the same evidence.

THE Undersigned have, by means of extensive machinery and improved processes, succeeded in reducing the price of the Szerelmey Iron Paint, that which was formerly sold at £55 they now supply at £33, and make other kinds, commencing at £20 per ton, including Black, Purple, Chocolate, Red, Green, Blue, Bronze Green, Grey, White, and various tints.

THE Szerelmey Liquid Enamel, sold ready for use, is the cheapest Anti-Corrosive Composition ever produced; it dries in four hours.

SZERELMEY Stone Paint thoroughly waterproofs brick and other walls without giving them the appearance of having been painted.

COPIES of the Reports of Sir Charles Barry, Sir R. J. Murchison, and Professor Faraday (printed by order of the House of Commons), with twenty years of favourable testimony,

Price lists, discounts, and all particulars may be had of

N. C. SZERELMEY & COMPANY

(LIMITED),

6, MARTIN'S LANE,

LONDON, E.C.

TORBAY AND DART PAINT COMPANY, LIMITED.

WORKS:

DARTMOUTH AND BRIXHAM, DEVON.

OFFICES:

23, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

SOLE PROPRIETORS AND MANUFACTURERS OF

WOLSTON'S CELEBRATED

TORBAY IRON PAINTS.

(ESTABLISHED 1851.)

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shornecliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only before use to be thinned down in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

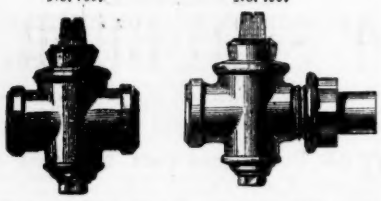
PRICES and TESTIMONIALS on APPLICATION.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:
SHORT STREET, LAMBETH, LONDON.

GEORGE ORME & CO.,
ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

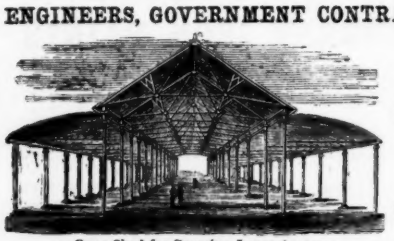
J. T. B. PORTER & CO.,
GAS ENGINEERS,
MANUFACTURERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

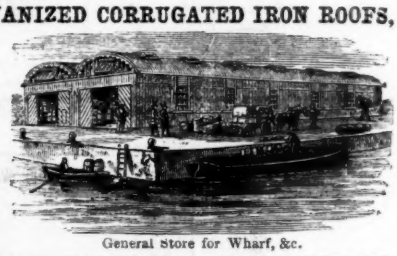
N.B.—It is most particularly requested that all Communications be addressed to the FIRM ONLY, as circumstances have arizen which render this necessary.

WHITAKER'S
PATENT RETORT CHARGING APPARATUS
(NOW AT WORK AT WAKEFIELD GAS-WORKS)
Effects a Great Saving in Labour,
Renders Gas Companies less Dependent on Skilled Stokers,
And can be Supplied and Erected at a Moderate Cost.
FOR FURTHER PARTICULARS, APPLY TO THE SOLE LICENSEE,
EDMUND ROBINSON,
(LATE OF 45, CROSS STREET,)
CITY BUILDINGS, CORPORATION STREET, MANCHESTER,
WHERE A WORKING MODEL MAY BE SEEN.

FRANCIS MORTON & CO., LIMITED, NAYLOR STREET, LIVERPOOL.
ESTABLISHED OVER A QUARTER OF A CENTURY.
ENGINEERS, GOVERNMENT CONTRACTORS, & MANUFACTURERS OF GALVANIZED CORRUGATED IRON ROOFS, BUILDINGS, AND SHEDDING,
For which Estimates will be given on application,
ERECTED COMPLETE IN THIS COUNTRY
OR
PREPARED TO PLAN FOR ERECTION ABROAD,
EITHER WITH
TIMBER FRAMING or WHOLLY in IRON.



Open Shed for Covering Large Areas.



General Store for Wharf, &c.

GALVANIZED or PAINTED CORRUGATED IRON ROOFING PLATES and TILES. HEAVY CORRUGATED IRON PLATES for FIREPROOF FLOORS, ROADWAYS, PARAPETS, &c. WROUGHT-IRON TANKS, GUTTERING and CONSTRUCTIONAL WROUGHT IRONWORK.
Designs prepared, and Illustrated Descriptive Catalogue forwarded on application.
LONDON OFFICE: 1, DELAHAY STREET (First door out of Great George Street), WESTMINSTER, S.W.

GAS PURIFICATION & CHEMICAL Co., LIMITED,
(Successors to JOHN WILLIAM O'NEILL & CO.,)
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL,
SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

W. & B. COWAN,

(ESTABLISHED 1827,)

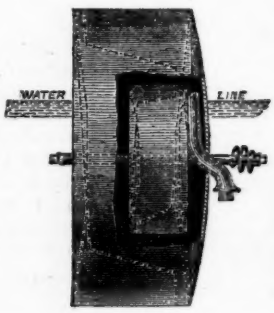
WET & DRY GAS-METER MANUFACTURERS,

CHURCH STREET,
MILLBANK STREET,
(NEAR THE HOUSES OF PARLIAMENT.) **LONDON, S.W.**

BUCCLEUCH ST. WORKS,
EDINBURGH.

From "THE JOURNAL OF GAS LIGHTING," Jan. 5, 1875.

"The changes effected in the construction of the wet meter are such that it now occupies a position which it never held before—that of an unvarying measure. . . . Both company and consumer are now equally protected, perfect accuracy of measurement is obtained, and that, too, without the least increase of mechanism, or the action of the meter in the least degree being prejudicially affected."



BRITISH ASSOCIATION of GAS MANAGERS, Leeds, 1875.

Inaugural Address of the President, JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

WARNER & COWAN'S
PATENT
"SELF-REGULATING DRUM" GAS-METER.

It is the ONLY Meter in which reliance can be placed.

It is the ONLY Meter in which the DRUM or WHEEL has been improved since it left the hands of Clegg and Crosley.

It is the ONLY Meter that POSSESSES AN UNVARYING MEASURING-CHAMBER.

It is the ONLY Meter FREE FROM delicate and complex compensating arrangements for maintaining water-line.

W. & B. COWAN,

(ESTABLISHED 1827,)

CHURCH STREET,
MILLBANK STREET,
(NEAR THE HOUSES OF PARLIAMENT.) **LONDON, S.W.**

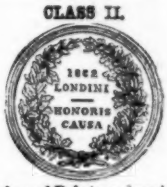
BUCCLEUCH ST. WORKS,
EDINBURGH.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.



This Paint having been in general use over fourteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

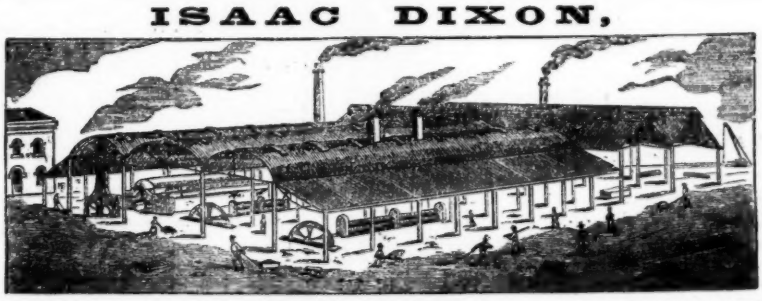
The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

ISAAC DIXON,

WINDSOR IRON-WORKS, LIVERPOOL.



LONDON OFFICES: 60, QUEEN VICTORIA ST., E.C.

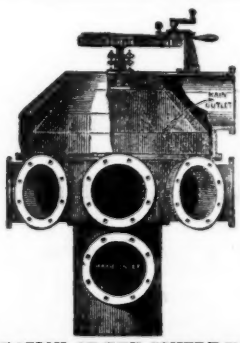
Manufacturer of **SELF-SUPPORTING GALVANIZED CORRUGATED, CURVED, and every kind of IRON ROOFING, CHURCHES, SCHOOLS, SHEDS, and IRON BUILDINGS.**

WROUGHT and CAST IRON GIRDERS, BRIDGES, TANKS, &c., and all kinds of WIRE WORK, FENCING, GATES, HURDLES, &c., for Home or Abroad.

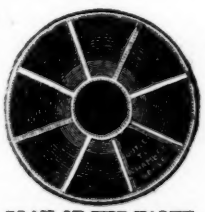
DIXON'S CELEBRATED SELF-SUPPORTING IRON ROOFS are specially suitable for Forges, Rolling-Mills, Iron-Works, Shipbuilding Yards, Mines, Collieries, Gas and Water Works, and for general purposes.

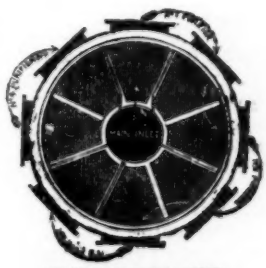
For Roofs with Timber Framing, DIXON'S GALVANIZED OR TARRED IRON SLATES form a durable and cheap covering, costing only about the same, when fixed, as felt and boards.

DRAWINGS, ESTIMATES, AND ILLUSTRATED CATALOGUES MAY BE OBTAINED ON APPLICATION.



C. & W. WALKERS' PATENT CENTRE-VALVES.





ELEVATION OF THE CENTRE-VALVE. **PLAN OF THE VALVE.** **PLAN OF THE BODY.**

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

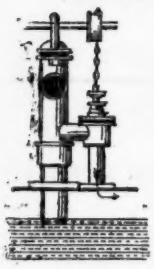
BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH

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GAS-VALVES,
AT GREATLY
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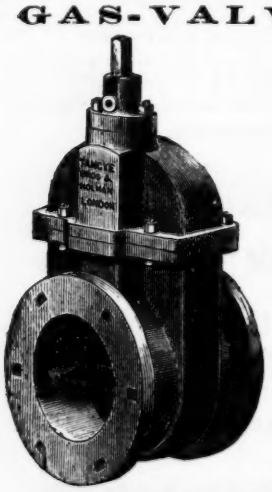

Inch.	s.	d.
3	25	0
4	36	0
5	40	0
6	54	0
7	63	0
8	80	0
9	85	0
10	100	0
12	120	0
14	140	0

TANGYE BROS. & HOLMAN,
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KÖRTING BROS.,

Steam-Jet Engineers,
SOLE LICENSEES FOR
W. CLELAND'S PATENT STEAM-JET GAS-EXHAUSTER,
AND
W. CLELAND'S PATENT STEAM SCRUBBER,
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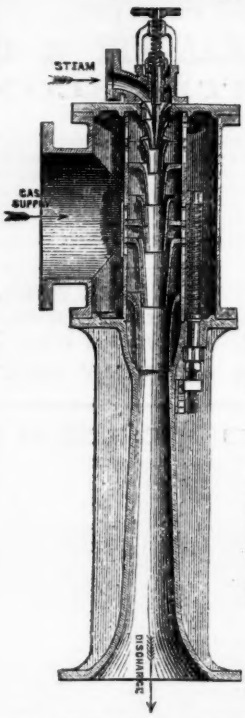
MANCHESTER.

Germany: Cellerstr. 35, Hannover.
Austria: Kolring., Pestalozzigasse 6, Vienna.
France: 11, Rue Louis-le-Grand, Paris.
U. S.: 1645, N. 10th St., Philadelphia.



E. KÖRTING'S PATENT
STEAM-JET GAS-EXHAUSTER.

Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.

UPWARDS OF 200 IN USE.
SUPPLIED TO—

Chartered Gas Co.	Horsham Gas Co.	Bury Gas-Works.
London Gas Co.	Epsom and Ewell Gas Co.	Glasgow Corporation.
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Phœnix Gas Co.	Cheltenham Gas Co.	Stalybridge Gas-Works.
Liverpool Gas Co.	Sandwich Gas Co.	Lincoln Gas-Works.
Bolton Corporation.	Cornholme Dis. Gas-Wks.	&c., &c., &c.

E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.

W. CLELAND'S PATENT STEAM SCRUBBER,
Combining small cost and thorough efficiency, with absence of any mechanical means and necessity of renewing the scrubbing material.

FOR PARTICULARS, APPLY TO

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MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
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SOLE AGENT FOR ENGLAND AND WALES.

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HYDRAULIC ENGINEERS,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 8000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

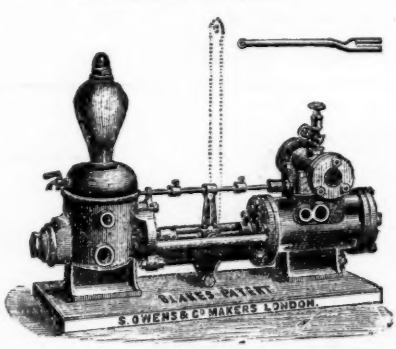
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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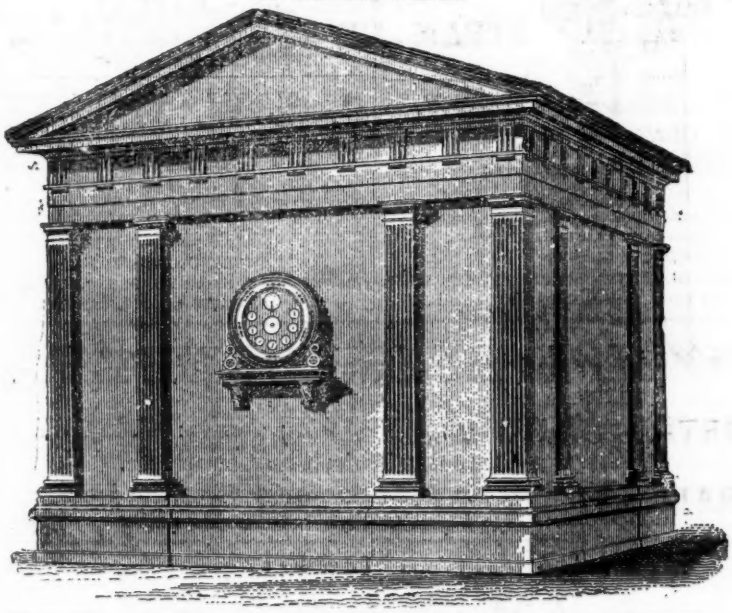
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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BROAD STREET, BIRMINGHAM.

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WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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PATENTEE and MANUFACTURER of the following Inventions:—

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STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

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BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

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BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

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As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers and Steam Joints.

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FOR

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MADE BY MACHINERY

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References to Hundreds of First-Class Engineers.

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"SELLARS' CEMENT"

PREVENTS WASTE OF GAS FROM RETORTS;

SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;

GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.

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THE GAS CEMENT WORKS,

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WILLIAM MACLEOD & CO.,

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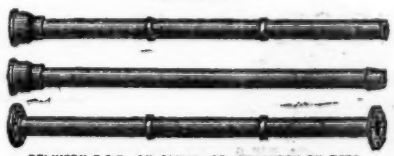

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The NEW PATTERN

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

THE

FRAMWELLGATE COAL COMPANY,

DURHAM,

Are prepared to supply their

SCREENED AND NUT GAS COALS.

This Coal yields 11,000 cubic feet of gas and 13½ cwts. of coke per ton.

OFFICES: ROYAL EXCHANGE, MIDDLESBROUGH.

HEBBURN MAIN GAS COALS.

Cubic feet of Gas yielded per ton . . .	10,050
Illuminating power in sperm candles . .	15·4
Yield of coke per ton of good quality . .	18½ cwts.

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GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

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Established 1840.

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Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAY.

Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

INTERNATIONAL EXHIBITION, 1862.

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PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for fifteen years; and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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THE WIGAN COAL & IRON COMPANY,

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DISTRICT OFFICE: 18, BENNETT'S HILL, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

SILKSTONE AND MIDLAND

GAS COAL & CANNEL.

EMOR G. WRIGLEY

Has on hand a quantity ready for immediate delivery, and is prepared to contract for Supplies during the years 1876 and 1877.

Can strongly recommend his real OLD SILKSTONE GAS COAL, which will give, in regular work, 10,200 feet 16·6-candle gas, and 12 cwt. superior coke.

PRICES AND ANALYSIS WILL BE FORWARDED TO ANY PART ON APPLICATION TO THE CHIEF OFFICE,

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STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.		Illuminating Power in Candles.		Coke per Ton of Coal used.		Ash in Coke, per Cent.		Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	....	15·85	....	12·66 cwt.	....	6·0	....	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

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ALBERT GAS COAL.

THE DERBYSHIRE
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Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	**10,775**
Weight of coke in lbs. per ton of coal	**1,465**

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

THE LOCHORE AND CAPLEDRAE CANNEL COAL COMPANY, LIMITED.

Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: CUSTOM HOUSE CHAMBERS, LEITH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.		Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	..	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	..	34·83
Value of 1 cubic foot of gas in grains of sperm	780	..	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	..	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	..	71 minutes.
Gravity of the gas (air = 1000)	596	..	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.		Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	..	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	..	33·09
Value of 1 cubic foot of gas in grains of sperm	878	..	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	..	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	..	67 minutes.
Gravity of the gas (air = 1000)	677	..	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company.

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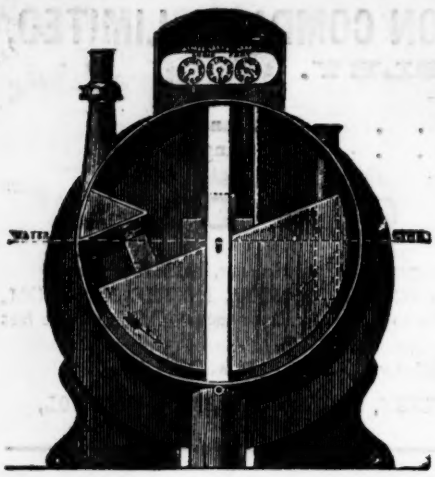

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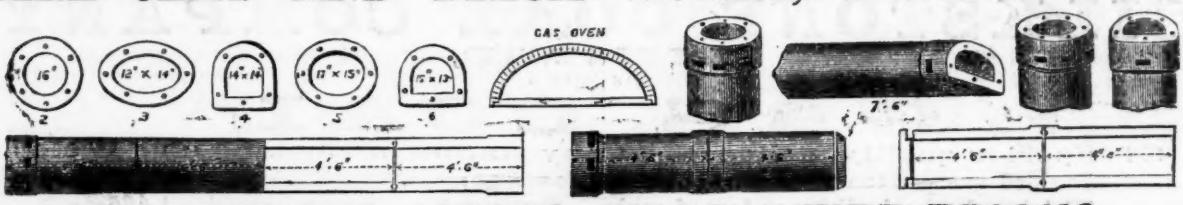

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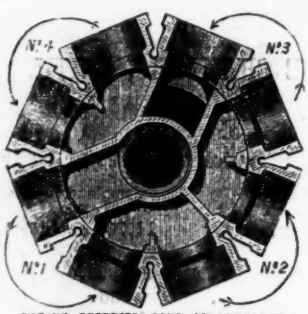

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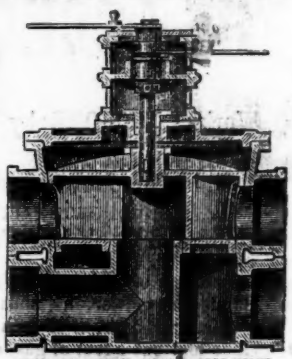

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